Bees of the Eastern United States

Volume II



By Theodore B. Mitchell

Florida Agricultural
Experiment Station Library
Gainesville, Florida

Dec., 1962 Tech. Bul. No. 152

Bees of the Eastern United States

Volume II



By Theodore B. Mitchell
Professor of Entomology
North Carolina State College

Withdrawn from UF. Surveyed to Internet Archive

Published by

The North Carolina Agricultural Experiment Station
with support from
The National Science Foundation

426
M682b
v.2
c.2

AGRI-
CULTURAL
LIBRARY

CONTENTS

	Page
Family Megachilidae	5
Lithurgus	6
Anthidium	9
Paranthidium	13
Dianthidium	15
Anthidiellum	18
Heteranthidium	23
Heterostelis	33
Stelis	35
Heriades	48
Prochelostoma	52
Ashmeadiella	53
Hoplitis	56
Osmia	69
Megachile	108
Coelioxys	192
Family Anthophoridae	233
Exomalopsis	235
Ptilothrix	240
Melitoma	242
Peponapis	244
Xenoglossa	246
Cemolobus	249
Anthedonia	251
Florilegus	253
Svastra	255
Melissodes	263
Xenoglossodes	311
Tetralonia	312
Anthophora	323
Emphoropsis	331
Centris	333
Nomada	338
Epeolus	438
Triepeolus	459
Holcopasites	486
Neolarra	490
Epeoloides	490
Melecta	492
Xeromelecta	493
Ericrocis	497
Family Xylocopidae	500
Ceratina	500
Xylocopa	507
Family Apidae	513
Bombus	513
Psithyrus	538
Apis	544
Appendix to Part I	547
List of distribution tables	549
Index	550

Foreword

This is the second and final part of a faunal study of the bees of the Eastern United States. It includes the families Megachilidae, Anthophoridae, Xylocopidae and Apidae, those groups which have sometimes been referred to as the long-tongued bees. The other four families, the so-called short-tongued bees, in which the glossa is usually quite short relative to its greatest breadth, includes the Colletidae, Andrenidae, Halictidae and Melittidae, and are covered in Part 1.* In these remaining families the glossa is much elongated and slender, and the two more basal segments of the labial palpi are similarly lengthened.

General morphology and classification are included in the Introduction of Part 1 and should be read for a proper understanding of the terminology employed. A key to the families (p. 20) separates not only those included in Part 1, but these in this remaining half of the work as well, and will be useful to the beginning student who is unfamiliar with the distinctions between them.

During the preparation of the manuscript of this portion of the work I have continued to receive the active support and cooperation of curators and other students of the bees. As a result, coverage is more nearly complete, and some errors of identity and additions to the synonymy have been avoided. Acknowledgment is due H. G. Rodeck for the manuscript of an unpublished key to the divisions of *Nomada* and for the loan of several of the Cockerell types of that genus; to C. D. Michener for assistance in a problem of species identity and sex association in *Hoplitis (Robertsonella)* and for the loan of a series of *Xenoglossa* from Kansas; to Paul D. Hurd, Jr. for supplying information in advance of publication on a new subspecies of *Xylocopa virginica* from Florida; to James A. Rehn of the Philadelphia Academy of Science, Mrs. Leonora K. Gloyd of the Illinois Natural History Survey, and E. G. Linsley of the University of California, for the loan of specimens needed in problems of identity; and to W. A. Stephen, Apiculture Specialist at North Carolina State College, for constructive criticisms of that part dealing with the honey bee.

I am indebted to Major Donald B. Baker of the British Army for a detailed description of the holotype of *Triepeolus coquilletti* Cockerell in the U. S. National Museum. While on a military assignment in the United States he was able to devote some of his time to a study of the epeoline bees in that museum, and his kindness in supplying this description, the need for which had not been anticipated, is much appreciated.

Wallace E. LaBerge, now at the University of Nebraska, has revised *Melissodes* and *Svastra*, and all of our eastern collections of those genera passed through his hands for identification. In consequence the taxonomy of these two groups represents conclusions following a thorough study of all the species of the New World, and probably will be less subject to change than some of the other large groups. He assisted also by sending on temporary loan several of the Swenk types of *Nomada*.

H. E. Milliron, at the Entomology Research Institute of the Canada Department of Agriculture in Ottawa, has been most helpful and cooperative in problems concerning *Bombus* and *Psithyrus*. He published a preliminary paper on the taxonomy of these genera, making possible some reference to current trends regarding their classification, and assisted in the identification of much of the material upon which the keys and descriptions in this work are based.

Finally I am especially indebted to Karl V. Krombein at the U. S. National Museum who has maintained an active interest in the progress of this work and has been especially helpful in calling attention to items of importance which otherwise might have been missed. He has also called attention to a number of errors in Part 1 which are included in the Appendix (p.000).

T. B. Mitchell
Emeritus Professor of Entomology
North Carolina State College

---

*N. C. Agricultural Experiment Station Technical Bulletin 141, 1960.

53414



Lithurgus gibbosus Smith male (upper) and female
Magnified 6 times

FAMILY MEGACHILIDAE

Females of the non-parasitic groups in this family are most easily recognized by the location of the pollen-collecting scopa on the venter of the abdomen. Also, the front wings, without exception, have but two submarginal cells, and the stigma is small. These are typical "long-tongued" bees, having a greatly elongated and slender glossa. Segments 1 and 2 of the labial palpi also are much elongated and flattened, with the two apical segments very short. The galeae of the maxillae are similarly elongated, the maxillary palpi with a variable number of relatively short segments. Except for the primitive genus *Lithurgus*, the pygidial area is absent, and without exception there are no facial foveae.

KEY TO GENERA

1. Pygideal area well developed in male, in female represented by a short terminal spine; scopa present in female, hind tibiae beset with coarse spicules or short spines ..... *Lithurgus* (p. 6)
   Pygideal area absent in both sexes; scopa present or absent; hind tibiae relatively smooth 2

2. Body surface usually ornamented with pale integumental maculations; claws in female cleft or with subapical inner teeth; stigma short, its inner margin not much longer than its width 3
   Body surface other than legs not maculated; claws in female with at most basal angles or teeth; stigma elongate 9

3. Scopa absent; mandibles in male black, or if maculated, then clypeus black, at least in part 4
   Scopa present; male mandibles yellow maculated and clypeus entirely yellow 5

4. Margin of scutellum somewhat protuberant, propodeum completely vertical, without a dorsal, pitted area ..... *Heterostelis* (p. 33)
   Scutellum not at all protuberant, propodeum with a narrow but distinct dorsal area ..... *Stelis* (p. 35)

5(3). Pulvilli (arolia) absent; mandible of female with five or more teeth ..... *Anthidium* (p. 9)
   Pulvilli present; mandible of female with at most four teeth 6

6. Hind margin of scutellum produced to form a carinate and broadly truncate lip over-hanging posterior surface of propodeum ..... *Anthidiellum* (p. 18)
   Hind margin of scutellum rounded ... 7

7. Anterior margin of pronotal tubercle broadly expanded, conspicuously carinate, extending along anterior border of notum ..... *Dianthidium* (p. 15)
   Pronotal tubercles not broadly expanded, not appreciably produced along anterior border of notum 8

8. Second recurrent vein received within or very near apex of second submarginal cell; abdominal terga with entire or nearly entire, transverse, apical or subapical, yellow or ivory bands; ocelli relatively large .. *Heteranthidium* (p. 23)
   Second recurrent vein received considerably beyond apex of second submarginal cell; abdominal yellow bands submedian, interrupted medially, not strongly narrowed toward mid-line; ocelli extremely small ..... *Paranthidium* (p. 13)

9(2). Scopa absent; scutellum with prominent axillary spines ..... *Coelioxys* (p. 192)
   Scopa present; axillary spines absent 10

10. Arolia absent; black, usually robust bees ..... *Megachile* (p. 108)
    Arolia present 11

11. Basal segment of abdomen with anterior face broadly concave 12
    Basal segment of abdomen at most narrowly concave or merely sulcate ... 13

12. Basal concavity of abdomen with a sharply carinate rim .... *Heriades* (p. 48)
    Basal concavity not carinate ..... *Ashmeadiella* (p. 53)

13(11). Tip of marginal cell approximate to costa; mandible of female narrow and elongate; form slender; color black ... . *Prochelostoma* (p. 52)
    Tip of marginal cell bent away from costa 14

14. Color black (in all eastern species); form usually slender; notaulices elongate linear ..... *Hoplitis* (p. 56)
    Color metallic blue or green; form usually short; notaulices punciform oval ..... *Osmia* (p. 69)

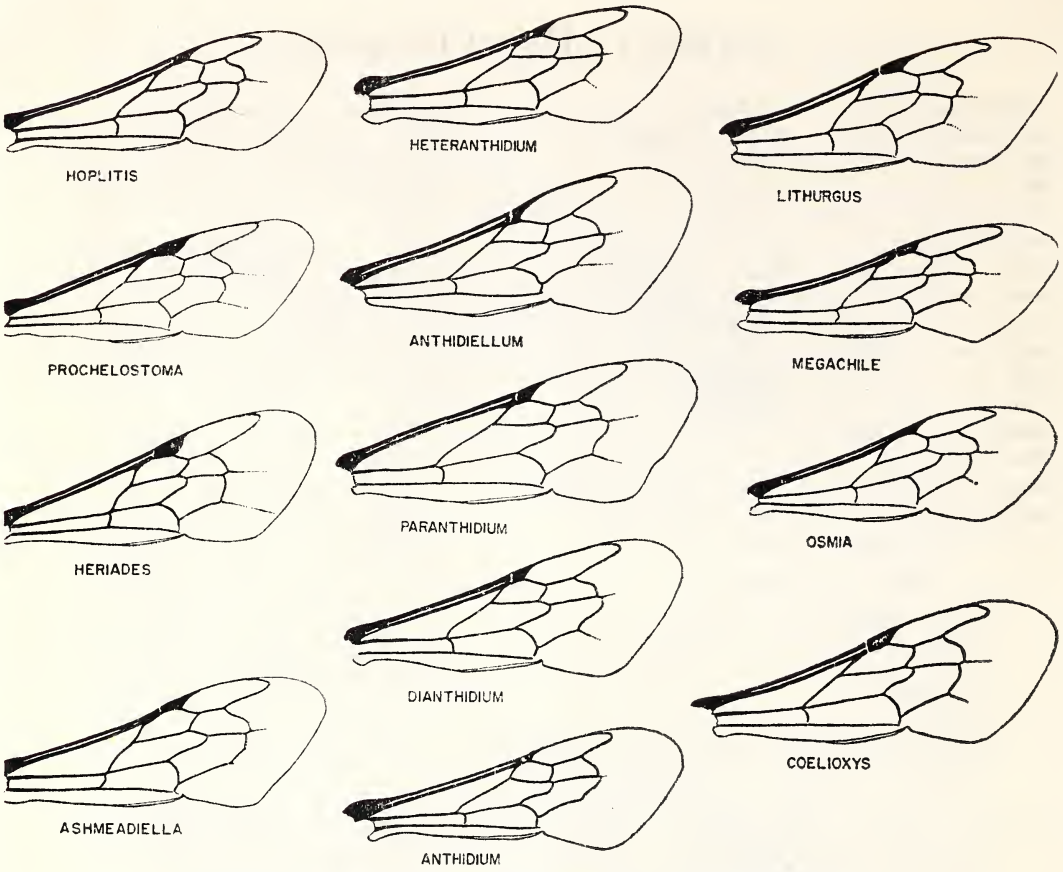


Figure 1—Venation of front wing in the Megachilidae.

Lithurgus Latreille

(Fig. 1)

Lithurge Latreille, 1825. Fam. Nat. Regne Anim., p. 463. (vernacular).
Type: *Andrena cornuta* Fabricius. Monob.

Lithurgus Berthold, 1827. In Latreille, Nat. Fam. Thierr. p. 467. (valid emend.).

Lithurgopsis Fox, 1902. Ent. News 13, p. 138.
Type: *Lithurgus apicalis* Cresson. Orig. desig.

Lithurgus Mitchell, 1938. Psyche 45, p. 146-155. (revision).

Lithurgus is a widely distributed group of rather primitive bees, at least with respect to the family Megachilidae. It is unique in this family in having a well developed pygidial area in the male, while in the female it is represented by a short, apical spine. The scopa is well developed, the tibiae of both sexes are coarsely spiculate, almost spinose, on the outer surfaces, and the proboscis is much elongated, exceeding the total length of the head and thorax. In the North American species, which constitute the subgenus *Lithurgopsis,* the males have aroliae between the claws, but these are inevident in the female. The males are further characterized by having a rather generalized abdomen, with six sternal plates exposed and only the 7th and 8th retracted.

It has been pointed out by Pate (1946. Brooklyn Ent. Soc. Bul. 41, p. 13) that Berthold's emendation of *Lithurge* to *Lithurgus* is valid.

KEY TO SPECIES

1. Females 2
   Males 3

2. Facial protuberance relatively narrow, projecting uniformly for the entire width ..... *gibbosus* Smith (p. 7)
   Facial protuberance much wider, projecting much more strongly at each side than in the central area ..... *brucei* Mitchell (p. 8)

3. Labrum with a robust, median, basal tubercle ..... *gibbosus* Smith (below)
Labrum with a pair of erect, basal tubercles, median area excavated .... *bruesi* Mitchell (p. 8)

Lithurgus (Lithurgopsis) gibbosus Smith

(Frontispiece & fig. 2)

Lithurgus gibbosus Smith, 1853. Cat. Hym. Brit. Mus. 1. p. 147. ♀.

Lithurgus compressus Smith, 1853. Cat. Hym. Brit. Mus. 1. p. 147. ♂.

Lithurgopsis gibbosus Fox, 1902. Ent. News 13, p. 140.

Lithurgus gibbosus Mitchell, 1938. Psyche 45, p. 151.

FEMALE—Length 17-18 mm.; black; length of face about equal to distance between eyes above; eyes slightly convergent below; facial protuberance below antennae prominant, projecting at right angles from surface of face, slightly bowed in facial view; clypeus quite flat, shining and sparsely punctate, apical margin straight, with a prominant silvery fringe; cheeks somewhat broader than eyes; mandibles 3-dentate, median tooth more prominant than the others; labrum densely ochraceous pubescent beyond the basal, transverse ridge which is emarginate medially; pubescence of head entirely pale, quite dense around antennae and along inner orbits, thin elsewhere, rather elongate on cheeks below; punctures fine and close on vertex medially, becoming somewhat more widely separated laterally, somewhat coarser and more distant on the shining cheeks below; dorsum of thorax dull, densely rugose, finely so on scutellum and on scutum posteriorly, becoming rather coarsely aciculate anteriorly; pleura distinctly punctate, closely and quite deeply so above, becoming more coarsely and more widely separated but not sparse below; propodeum relatively smooth but rather dull, punctures very shallow and obscure; tegulae piceous, quite smooth but rather dull, not noticeably punctate; wings subhyaline, veins and stigma piceous; hind tibiae coarsely aciculate, the fore and mid tibiae quite deeply, distinctly and closely punctate, aciculate along posterior margin toward apex, femora shining, quite sparsely punctate; thoracic pubescence very short and inconspicuous above, more dense and elongate laterally and beneath, largely whitish; whitish and quite copious and elongate on basal segments of legs, the basitarsi rather prominantly fringed, more or less fuscous beneath and on hind tarsi; spurs testaceous; abdominal terga shining, punctures on basal terga very minute if at all evident medially, becoming more distinct but fine and close laterally, those on the more apical terga becoming coarser and more sparse; terga 2-5 with white, apical fasciae, these widely interrupted on 2 and 3, entire and very dense and conspicuous on 4 and 5, 6 with a dense covering of coarse, blackish pubescence which nearly hides the pygidial spine, ventral scopa pale ochraceous, sterna with thin, entire, white, apical fasciae, but that on sternum 5 quite dense and conspicuous.

MALE—Length 15-16 mm.; black; face considerably longer than distance between eyes above; eyes rather strongly convergent below; face below antennae somewhat swollen but not protuberant, quite densely punctate; clypeus slightly convex, densely rugoso-punctate, median portion of apical margin quite straight; labrum with a quite robust, median, elongate spine at base just below margin of clypeus; cheeks subequal to eyes in width; face above antennae very closely but rather finely punctate, punctures quite deep and distinct, quite dense on cheeks throughout; pubescence of head entirely whitish, quite dense around antennae, along inner orbits and across apical margin of clypeus, rather thin above, quite elongate and copious on cheeks below; dorsum of thorax densely rugoso-punctate, finely so on scutellum and over most of scutum, but this becoming somewhat more distinctly punctate anteriorly; pleura quite closely and finely punctate beneath rather dense pubescence; propodeum rather smooth, punctures fine and rather shallow except in dorsal area; pubescence of thorax entirely whitish, except that there is some faint yellowing on scutum and scutellum, quite dense and elongate laterally and on propodeum, largely whitish on legs, quite dense on anterior femora and on the apical segments, as also on mid tibiae; femora and tibiae rather closely but quite distinctly punctate, not to any marked degree aciculate; spurs testaceous; tegulae piceous, rather densely pubescent anteriorly and along inner margin, not noticeably punctate; wings subhyaline or faintly infuscated, veins and stigma piceous; abdominal terga somewhat shining, the more basal terga minutely and rather obscurely punctate medially, punctures becoming more distinct but fine and close laterally, those on 4 and 5 somewhat coarser and more widely separated medially, but becoming close laterally, and close over entire extent of 6; pubescence entirely pale on basal tergum, but discal pubescence on the following terga more or less blackish, very short and inconspicuous medially, becoming more noticeable toward extreme sides; terga 2-6 with white, apical fasciae, these more widely interrupted on the more basal terga, entire on 5 and 6; abdominal

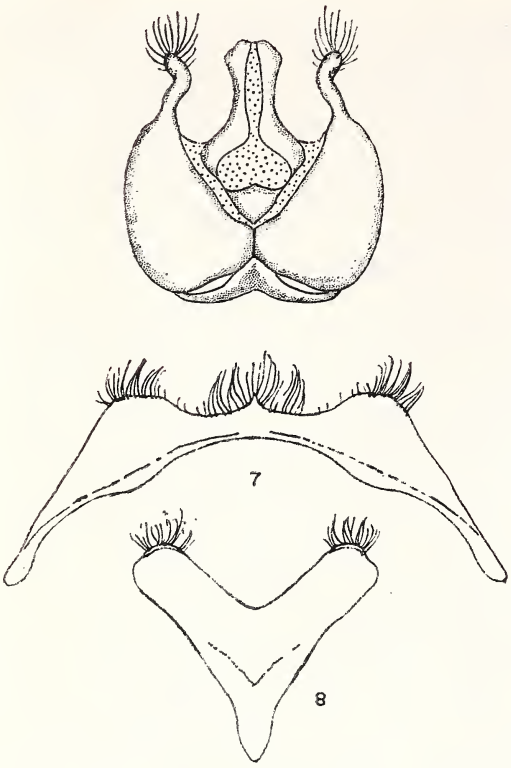


Figure 2

Genital armature and sterna 7 and 8 in males of *Lithurgus gibbosus*.

sterna entirely pale pubescent, the apical fasciae very narrow and obscure; sterna 7 and 8, and genital armature as shown, (fig. 2).

DISTRIBUTION—North Carolina to Florida and Texas, March to July, but as early as January in Florida.

FLOWER RECORDS—*Opuntia* is the principal flower upon which this depends for pollen, but it has been collected also on *Cirsium, Helianthus, Ilex, Pontederia* and *Rudbeckia*.

Lithurgus (Lithurgopsis) bruesi Mitchell

Lithurgus bruesi Mitchell, 1927. Psyche 34, p. 104. ♂.

Lithurgus bruesi Mitchell, 1938. Psyche 45, p. 150. ♀.

Lithurge bruesi Michener, 1954. Kans. Ent. Soc. Jour. 27, p. 1.

FEMALE—Length 13-16 mm.; entirely black, including tegulae and legs; face considerably longer than distance between eyes above; eyes slightly convergent below; facial prominance low medially, strongly protuberant at each side; clypeus smooth, shining, with rather fine, sparse but distinct punctures, apical margin straight, with a quite prominant fringe of long greyish hairs; cheeks much broader than eyes; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; mandibles 3-dentate, middle tooth rather prominant; labrum with a basal, transverse process, which has a slight median, and a pair of lateral, emarginations; pubescence of head entirely pale, rather copious around antennae and down inner orbits, quite long and copious on lower part of cheeks; punctures fine and close on face above antennae and on vertex, becoming rather sparse above each eye and more shallow and indefinite along cheeks, becoming rather coarse and close below; scutum dull, finely and densely rugose, becoming almost reticulate anteriorly, scutellum finely rugose except along posterior margin; pleura distinctly but finely and closely punctate; propodeum smooth but rather dull; tegulae smooth, with some minute and close punctures anteriorly; wings subhyaline, veins and stigma piceous, recurrent veins entering 2nd submarginal cell subequally distant from base and apex; hind tibiae coarsely spiculate on outer surface, mid tibiae more finely so, and front tibiae more punctate than spiculate; spurs pale yellowish; legs largely pale pubescent, but mid basitarsi with some blackish hairs beneath apically, and hind basitarsi with prominant, erect, black, seta-like hairs; abdominal terga 1-3 shining and practically impunctate medially, becoming finely, closely and quite distinctly punctate toward sides, terga 4-5 more distinctly punctate medially, punctures of 5 quite deep, distinct and relatively coarse; terga 2-5 with whitish, apical fasciae, these widely interrupted on 2, somewhat less so on 3, entire on 4, and entire and conspicuous on 5; discal pubescence extremely short and inconspicuous on the more basal terga, becoming quite distinct but very short on tergum 5 where it is largely black, tergum 6 with a dense covering of fuscous pubescence which completely hides the surface except for the median, apical spine; scopa pale yellowish, with a few black hairs on sternum 5; sterna 1-5 with narrow but entire, whitish, apical fasciae, discs with rather coarse, well separated but hardly sparse punctures, these becoming relatively close and fine on the basal sterna, sternum 6 triangular, with a narrow, impunctate, median line, closely and deeply punctate on each side.

MALE—Length 10-13 mm.; entirely black, including tegulae and legs; face somewhat longer than distance between eyes above; eyes

slightly convergent below; supraclypeal area slightly elevated but hardly protuberant; clypeus slightly convex, apical margin straight, quite strongly thickened medially; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; cheeks considerably broader than eyes; mandibles 3-dentate, middle tooth acute and prominant; labrum with a pair of basal, erect, spine-like tubercles, rather deeply excavated between them; pubescence of head entirely pale, rather copious around antennae and along apical margin of clypeus, quite elongate and copious on cheeks, especially below; punctures very close, fine and rather indistinct on vertex medially and on cheeks, becoming much more coarse, deep and distinct between eyes and ocelli and toward antennae, supraclypeal area shining and very sparsely punctate, clypeus with a median, rather sparsely punctate area but becoming densely rugoso-punctate on each side; scutum and scutellum finely and densely rugoso-punctate throughout, pleura with fine, densely crowded punctures, almost rugose; propodeum smooth and somewhat shining, punctures very shallow, fine and indefinite; tegulae smooth and somewhat shining, becoming minutely and closely punctate anteriorly; wings subhyaline, veins and stigma piceous, recurrent veins entering 2nd submarginal cell subequally distant from base and apex; front and mid tibiae rather coarsely and closely spiculate over anterior half, hind tibiae more rugose than spiculate; pubescence of legs largely pale, rather long and copious, but hind basitarsi with a few black hairs apically; spurs pale yellow; thoracic pubescence whitish in large part, somewhat more ochraceous on scutum, quite dense and elongate laterally and below; abdominal terga somewhat shining, very minutely and rather sparsely punctate medially on 1-4, these becoming rather closely and finely punctate laterally, 5 and 6 with deeper and more distinct punctures, these close laterally on 5 and very close over entire breadth of 6; terga 2-6 with whitish and quite dense apical fasciae, slightly interrupted on 2, discal pubescence pale on basal terga, becoming darker apically, conspicuous and black on terga 5 and 6, 7 with elongate, largely blackish hairs which do not hide the rather obscurely rugose surface, the plate terminated in a triangular pygidium; abdominal sterna somewhat shining between rather deep and distinct punctures, these fine and close on the more basal segments, becoming somewhat more widely separated apically; genital armature and sterna 7 and 8 resembling those of *gibbosus* (fig. 2).

DISTRIBUTION—Mexico, through Texas to Illinois, March to June.

FLOWER RECORD—*Opuntia.*

Anthidium Fabricius

(Fig. 1)

Anthidium Fabricius, 1804. Systema piezatorum, p. 364. Type: *Apis manicata* Linnaeus. Desig. by Latreille, 1810.

Anthidium Swenk, 1913. Nebr. Univ. Studies 14, pp. 9-18. (Nebr. species)

Anthidium Cockerell, 1925. Calif. Acad. Sci. Proc. (4) 14, pp. 345-361. (western species)

Anthidium spp. Hicks, 1926. Univ. Colo. Stud. p. 242. (biology)

Anthidium Schwarz, 1927. Amer. Mus. Novitates 252, pp. 1-22; 253, pp. 1-17.

Anthidium Michener, 1948. Amer. Mus. Novitates 1381, p. 15.

Anthidium resembles the other anthidiine genera in having conspicuous yellowish or whitish maculations and in the very short stigma of the front wing. It differs from all of these in lacking membraneous pads, the arolia, between the claws. In addition, mandibles in the female are multi-dentate, with from 5 to 7 or more small teeth along the expanded margin. The pleura are not vertically carinate, nor are the prothoracic tubercles carinate. In the males, sterna 5-8 are retracted and to a considerable degree modified. The maxillary palpi are 2-segmented.

Only two species of *Anthidium* are known to occur in the East, but in the West more than fifty species and subspecies are listed in the Catalog of Hymenoptera (p. 1139). They nest commonly in the soil, using plant hairs in the construction of the cells, and are known to use pebbles to fill in cavities above the cells.

KEY TO SPECIES

1. Males 2
   Females 3
2. Front of scape yellow; abdominal terga each with four separated yellow maculae ..... *maculifrons* Smith (below)
   Scape entirely black; abdominal terga 2-5 each with an interrupted, transverse, yellow band ..... *psoraleae* Robertson (p. 11)
3. Face with yellow maculae ..... *maculifrons* Smith (below)
   Face entirely black ..... *psoraleae* Robertson (p. 11)

Anthidium maculifrons Smith

(Fig. 3)

Anthidium maculifrons Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 214. ♀

Anthidium cognatum Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 109. ♀ ♂
Anthidium maculifrons Hungerford and Williams, 1912. Ent. News 23, p. 256. (biology)
Anthidium cognatum Schwarz, 1927. Amer. Mus. Novitates 253, p. 3.
Anthidium maculifrons Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 369. (synonymy)
Anthidium cognatum Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, with yellow maculations; clypeus with a pair of lateral, subapical, rounded maculations, a pair of slightly larger, oblong maculations between clypeus and lower inner orbits; mandibles yellow at base; vertex with a pair of small and narrow maculations on each side; tegulae with a small antero-lateral maculation, a similar one at each extreme side of scutum, adjacent to tegula; a small maculation on each axilla, and posterior margin of scutellum narrowly yellow, this band interrupted medially; abdominal terga 1-4 with large, yellow maculations at each extreme side and a pair of narrow, transverse and rather short maculations near center, the inner and outer maculations on terga 2-4 narrowly connected; tergum 5 with a pair of larger, submedian, transverse maculations which are only slightly separated and a narrow band connecting these with the extreme lateral margin, but without the lateral yellow spot; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks somewhat narrower than eyes; clypeus slightly convex, apical margin somewhat thickened, very finely tuberculate on each side, median area nearly straight; mandibles with 7 or 8 fine and rather irregular teeth; vertex and cheeks not carinate; tegulae shining, with minute and slightly separated punctures; wings subhyaline, veins piceous; legs black in large part, tibiae with elongate, basal, yellow maculations on outer face, front and middle tarsi with dense, short, snowy white pubescence, this somewhat more elongate on posterior side; spurs testaceous; pubescence short, and thin in general, entirely pale, white and rather copious between antennae and ocelli, on lower portion of cheeks, on pleura and lateral faces of propodeum; ventral scopa white; punctures fine and close over entire head and thorax, very fine and densely crowded between antennae and ocelli and on vertex medially, somewhat more coarse and irregular on clypeus, more distinct, with very narrow but definite intervening lines on scutum and scutellum; abdominal terga somewhat shining, punctures quite close but distinct, deep and rather well separated and coarser on anterior portion of basal tergum, the slightly depressed apical rims on terga 1-5 somewhat more finely and closely punctate, tergum 6 about twice as broad as median length, broadly triangular, with a median angle and a small angle at each extreme side, margin between minutely crenulate.

MALE—Length 11-12 mm.; black, with yellow maculations; clypeus, outer face of mandibles, scape, lateral facial maculae terminating abruptly at level of antennae, and a pair of transverse, narrow bands on each side of vertex, yellow; anterior margin of scutum with a pair of small, yellow maculations on each side, near but not attaining the tubercles, and a very small one adjacent to tegulae; axillae with rather small maculations, and posterior margin of scutellum narrowly yellow, this band interrupted medially; abdominal terga 1-5 with four maculations across each disc, the lateral pair quite large, median pair smaller, the inner and outer maculation on 2-5 narrowly connected, 6 with a pair of submedian, more or less rounded maculations that are slightly separated medially; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex; clypeus slightly convex, apical margin very slightly incurved across median third; labrum with a pair of small tubercles near base, entirely black; mandibles conspicuously 3-dentate, inner tooth about mid way between the apical and inner teeth, the teeth black in marked contrast to the yellow base; tegulae with a yellow, antero-lateral blotch, otherwise dark, surface very finely and quite closely punctate; wings subhyaline, veins more piceous; coxae, trochanters and femora entirely black, each front and mid tibia with a yellow stripe along outer face, hind tibiae with a small, basal, yellow spot, otherwise these joints black; tarsi yellow, becoming somewhat more brownish at tips, front and mid pair with dense, snowy white pubescence which forms a rather conspicuous but short posterior fringe, hind tarsi with a somewhat similar anterior fringe; tegulae yellowish; hind trochanters with a very small and inconspicuous posterior tubercle; pubescence rather strongly ochraceous above on head and thorax, becoming snowy white laterally and beneath, quite copious over most of face, on vertex medially, and on cheeks below, thin on thorax dorsally but quite dense on pleura and propodeum, short and inconspicuous over most of abdomen; punctures very fine and close over entire head and thorax, somewhat less conspicuous on maculated areas of face and clypeus, and to a considerable degree obscured by pubescence above antennae; scutum densely and finely rugoso-punctate, punctures somewhat more

distinct but very close on scutellum and pleura; terga 1-5 of abdomen shining, punctures distinctly although not widely separated on the more basal areas of each disc, the broadly impressed, apical margins more finely and closely but quite regularly punctate, those on 6 close and fine, 7 with a distinct, median spine, and on each lateral angle a robust, subtruncate projection, giving a tri-dentate appearance; extreme lateral angles of tergum 6 with a robust, slightly curved but rather short spine; abdominal sterna 1-5 exposed, more or less copiously pubescent, especially laterally, sterna 6-8 retracted, form as shown (fig. 3); genital armature as shown.

DISTRIBUTION—Mexico and Arizona, east to Illinois, Virginia and Florida, March to November in the more southern parts of its range.

FLOWER RECORDS—*Afzelia, Bidens, Cracca, Crotalaria, Galactia, Galax, Phaseolus* and *Psoralea*. Robertson (1929) records it on *Asclepias* and *Coreopsis*.

Anthidium psoraleae Robertson

(Fig. 3)

Anthidium psoraleae Robertson, 1902. Canad. Ent. 34, p. 322. ♀ ♂

Anthidium emarginatum bilineatum Schwarz, 1927. Amer. Mus. Novitates 252, p. 4. ♂

Anthidium psoraleae Schwarz, 1928. Canad. Ent. 60, p. 214.

Anthidium psoraleae Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 384.

Anthidium psoraleae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11 mm.; black, with yellow maculations; vertex with a narrow, elongate maculation extending from each eye to posterior margin, head otherwise black; tubercles with a very small, yellow spot, and tegulae with an anterior, yellow blotch; scutum black except for a narrow, marginal, yellow mark at each extreme side adjacent to tegulae; scutellum with a narrow, posterior, yellow border, this interrupted medially; thorax otherwise black; basal abdominal tergum with a pair of angular blotches on each extreme side and a pair of widely separated and quite small spots between, terga 2-5 with transverse bands that are slightly separated medially, these very narrow, becoming abruptly broadened at each extreme side except on tergum 5, tergum 6 entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly broader than eyes; clypeus rather flat, apical margin smooth and somewhat thickened, straight except for a pair of minute denticles at each extreme side; mandibles with seven small but well developed and distinct teeth, entirely black; tegulae shining, with minute and slightly separated punctures; wings subhyaline, veins piceous; legs entirely black, basitarsi somewhat longer than following segments combined, spurs yellowish; pubescence entirely whitish, rather thin but somewhat elongate, more copious around antennae, on lower cheeks, on pleura and propodeum laterally, and on basal abdominal tergum, the ventral scopa entirely white; punctures quite deep and distinct but rather fine and close in general, densely crowded over face below antennae, on cheeks and on pleura, more distinctly separated but still close on vertex, scutum and scutellum; quite distinctly separated but still rather close on disc of basal abdominal tergum, the apical, impressed area more closely and finely punctate, discs of the following terga somewhat more closely punctate, but punctures not crowded, those on 7 densely crowded; tergum 7 triangular in outline, with a low median protuberance which is narrowly bi-dentate, and a strong, lateral angle on each side, a broad and rather deep emarginate area between these three projections.

MALE—Length 12-13 mm.; black, with yellow maculations; outer surface of mandibles, entire clypeus, lateral facial maculae ending abruptly at level of antennae, and a small maculation between upper end of eye and margin of vertex, yellow; upper portion of face, entire cheeks and antennae, black; tubercles with a very small yellow spot, and tegulae with a rather large yellow blotch, scutellum narrowly rimmed with yellow posteriorly, this interrupted medially, entire thorax otherwise black; basal abdominal tergum with rather large, angular, yellow blotches at each extreme side and a pair of widely separated, small, yellow spots between; terga 2-5 with transverse, lateral maculae which are narrowly interrupted medially, these quite narrow but abruptly broadened at each extreme side, less so on 5, 6 with a pair of small, oblique spots which are only slightly separated, 7 entirely black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex; cheeks somewhat broader than eyes; clypeus slightly convex, only slightly broader than median length, apical margin nearly straight; mandibles distinctly 3-dentate, median tooth nearer apical tooth than to inner angle; tegulae somewhat shining, but finely and rather closely punctate; wings subhyaline, veins piceous; legs black in large part, but tibiae with apical, yellow blotches, basi-

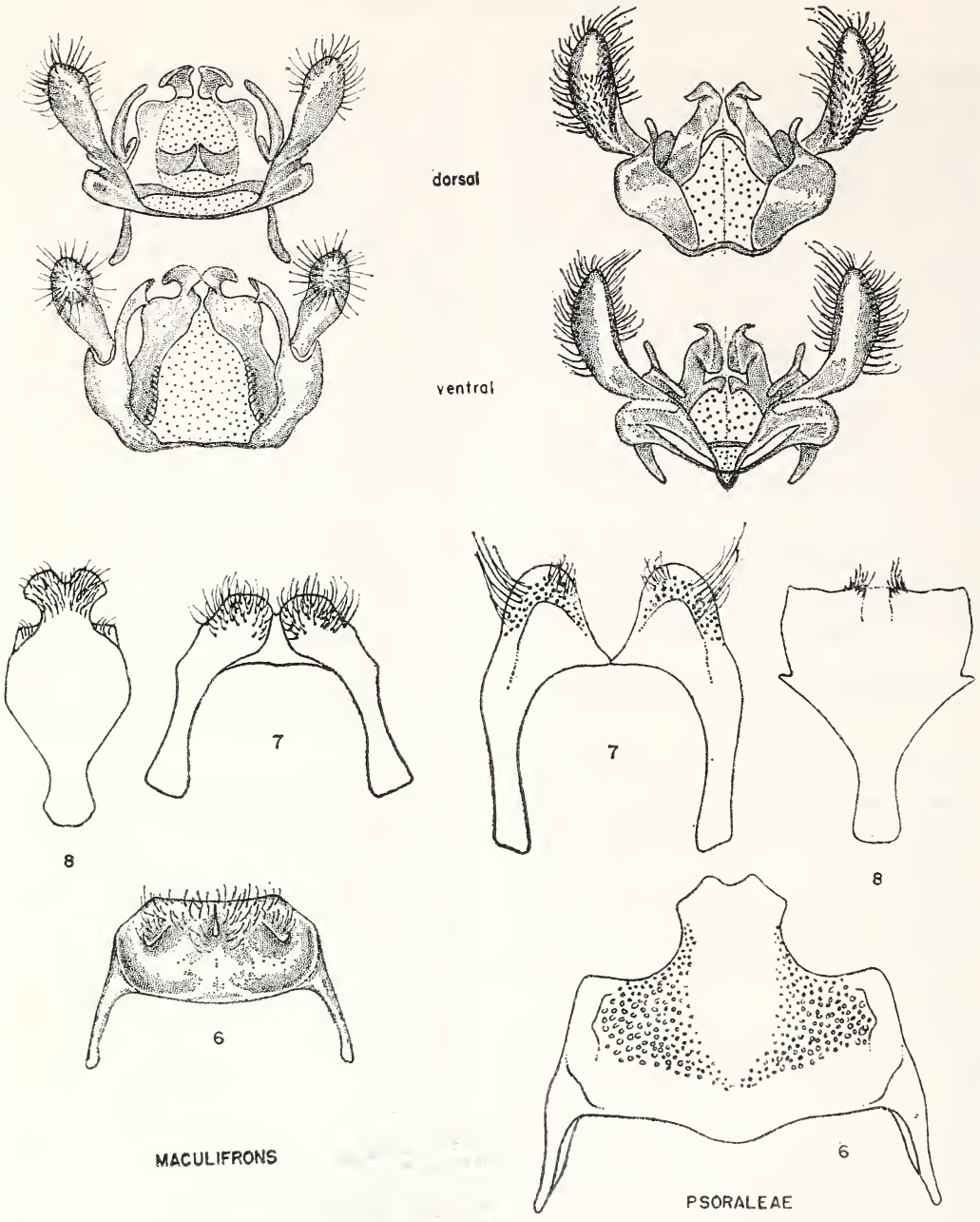


Figure 3—Dorsal and ventral views of genital armature and sterna 6-8 in males of *Anthidium*.

tarsi yellow in large part, with dense white pubescence, the more apical tarsal segments becoming piceous; spurs yellow; pubescence entirely pale, quite thin, rather elongate over head and thorax, more dense around antennae and on pleura and propodeum; punctures quite deep but rather fine and close generally, densely crowded between ocelli and antennae and on cheeks, more distinct but still close on pleura, vertex, scutum and scutellum; abdominal terga somewhat shining, punctures on disc of basal tergum rather definitely separated, the depressed apical margin very finely and closely punctate, discs of the following terga more closely punctate, becoming crowded on 6 and 7; tergum 6 with a robust, curved spine at each extreme side; 7 with a slender, median spine, lateral margins evenly rounded, a deep emargination separating the median spine from the more truncate, lateral areas; sterna 1-5 exposed, more or less fringed apically with erect, rather elongate, pale pubescence, terga 6-8 and genital armature as shown (fig. 3).

DISTRIBUTION—Colorado and North Dakota, east to Illinois and Michigan, July. Possibly the range of this species extends to the Pacific Coast.

FLOWER RECORDS—Robertson (1929) records this species on *Astragalus, Lobelia, Psoralea, Trifolium* and *Verbena.*

Paranthidium Cockerell and Cockerell

(Fig. 1)

Anthidium subg. *Paranthidium* Cockerell and Cockerell, 1901. Ann. Mag. Nat. Hist. (7) 7, p. 50. Type: (*Anthidium perpictum* Cockerell) = *Paranthidium jugatorium perpictum* (Cockerell). Orig. desig.

Paranthidium Schwarz, 1926. Amer. Mus. Novitates 226, pp. 19-25 (review).

Paranthidium subg. *Mecanthidium* Michener, 1942. N. Y. Ent. Soc. Jour. 50, p. 278.

Paranthidium Michener, 1948. Amer. Mus. Novitates 1381, p. 10.

In *Paranthidium* there is no carina separating the anterior and lateral faces of the mesopleura, but the prothoracic tubercles are sharply carinate, although short. The scutellum is rounded and the posterior face of the propodeum is completely vertical. The mandibles in the female are broad apically, with a pair of low, median teeth between the apex and inner angle, resulting in a 4-dentate condition. In the males they are 3-dentate. The maxillary palpi are 3-segmented; arolia are present; and the 2nd recurrent vein terminates beyond the tip of the 2nd submarginal cell.

KEY TO SPECIES

1. Males 2
   Females 3
2. Vertex and tergum 7 largely or entirely black .... *jugatorium jugatorium* (Say)
   Vertex with a more or less continuous yellow band extending down to mid point of cheeks; tergum 7 yellow .... *jugatorium lepidum* (Cresson) (p. 15)
3. Lateral facial maculae broad, not much narrowed above, reaching top of eye; vertex usually conspicuously banded; tubercles yellow or yellow- maculated .. *jugatorium lepidum* (Cresson) (p. 15)
   Lateral facial maculae narrowed above; vertex entirely black or with a much reduced and incomplete yellow band; tubercles black .... *jugatorium jugatorium* (Say)

Paranthidium (Paranthidium) jugatorium jugatorium (Say)

(Fig. 4)

Megachile jugatoria Say, 1824. *In* Keating, Narr. Long's 2nd Exped. 2, p. 352. ♀.

Stelis obesa Say, 1837. Boston Jour. Nat. Hist. 1, p. 398. [♂].

Paranthidium jugatorium Schwarz, 1926. Amer. Mus. Novitates 226, p. 23.

FEMALE—Length 8 mm.; black, with yellow maculations; clypeus yellow laterally, black medially, lateral facial maculations narrowed above, terminated near top of eye; a small band back of each eye, a narrow band on each side of scutum extending on to anterior margin, a pair of posterior bands on scutellum, all yellow; axillae and tubercles black; abdominal terga with transverse, lateral maculations, separated medially, widely so on basal tergum, that on apical tergum extensive and complete; face only slightly longer than distance between eyes above; eyes subparallel; ocelli very small, their diameters only about twice that of the neighboring punctures, lateral ocelli somewhat nearer margin of vertex than to eyes; clypeus slightly convex, apical margin slightly out-curved, obscurely crenulate, with a slight median emargination; mandibles entirely black, broadened apically, obscurely 4-dentate; cheeks very slightly broader than eyes; malar space hardly evident; wings faintly infuscated, more deeply so in region of marginal cell, veins and stigma piceous; tegulae very finely and closely but distinctly punctate, with an obscure, anterolateral, yellow spot; coxae, trochanters and basal portion of femora piceous, tibiae and apex of femora reddish-yellow, tarsi more brownish, front and mid tibiae rather bright yellowish anteriorly, their basitarsi quite slender, about equal in length to the following segments combined, hind basitarsi slightly longer than the following segments, quite broad and flat but narrower than their tibiae; spurs yellow; pubescence short, thin and inconspicuous, uniformly very pale ochraceous over entire body; ventral scopa entirely pale yellow; punctures deep, distinct and quite coarse, close over lower part of face, on cheeks, and over most of thorax, well separated above antennae and on vertex, slightly so on scutellum; punctures much finer and well separated on abdominal terga 2-5 medially, becoming quite close laterally, apical margins narrowly impunctate; basal tergum with coarse, well separated punctures across base, these becoming fine and close along apical margin, those on tergum 6 very fine and densely crowded.

MALE—Length 8-9 mm.; black, with yellow maculations; clypeus, mandibles in large part, three small spots on labrum, narrow lateral

maculations ending at top of eye, a rather narrow band back of each eye above and a smaller one below, and a very narrow stripe in middle of vertex, yellow; scutum with a narrow yellow band on each side extending on to anterior margin, median third of margin black; axillae and posterior half or more of scutellum yellow; pleura and tubercles entirely black; basal portions of legs black, but apex of femora, anterior and outer surfaces of front and mid tibiae, entire hind tibiae and all tarsi, yellow; abdominal terga 1-6 with transverse, yellow bands which are slightly interrupted on 1-4, entire on 5 and 6, 7 variable, usually blackish apically, more or less yellowish toward base; face slightly longer than distance between eyes above; eyes slightly convergent below; ocelli very small, diameter only about twice that of the neighboring punctures, lateral pair considerably nearer margin of vertex than to eyes; clypeus quite evenly convex, apical margin slightly out-curved, with about four minute denticles; mandibles distinctly 3-dentate, middle tooth somewhat nearer apex than to inner angle; cheeks narrower than eyes; malar space inevident; tegulae finely punctate, yellow, with a median, brownish area, the rim more hyaline; wings faintly infuscated, quite deeply so in region of marginal cell, veins and stigma piceous; basitarsi uniformly slender, about equalling the following segments combined; spurs pale yellow; pubescence largely pale ochraceous, very short, thin and inconspicuous, somewhat more whitish and more dense on thorax below, very short and barely evident on abdominal terga; punctures deep, distinct and quite coarse, close over most of face and cheeks, scutum, pleura and posterior face of propodeum, somewhat more widely separated just below ocelli, on vertex laterally, and on scutellum; abdominal terga shining, punctures deep and distinct but variable as to size and spacing, in general rather fine and close toward the narrow, apical, impunctate rims, coarse and more distant across middle; tergum 7 protuberant medially, with a narrow, acute angle on each extreme side; sterna 1-3 yellow, rather fully exposed, 4 partially exposed, with a median, conspicuous, apical, piceous comb, 5 largely hidden, with lateral narrow areas on each side bearing a piceous comb similar to that on 4, 6-8 as shown (fig. 4); penis valves rather short, acutely pointed, the gonostyli angulately dilated as shown.

DISTRIBUTION—Minnesota to New York and New Jersey, July and August.

FLOWER RECORD—*Helianthus.*

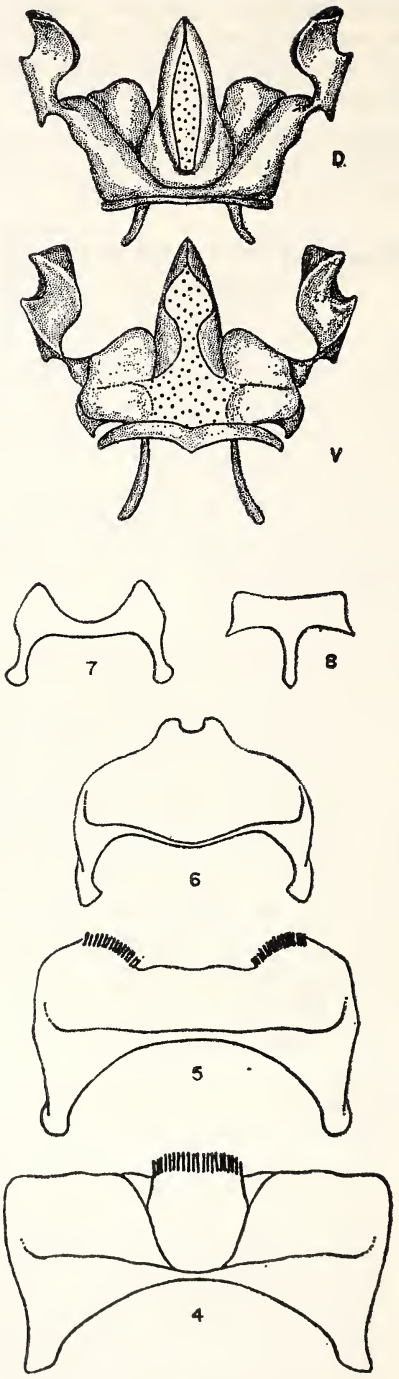


Figure 4

Dorsal and ventral views of genital armature, and sterna 4-8 in males of *Paranthidium*.

Paranthidium (Paranthidium) jugatorium lepidum (Cresson)

Anthidium lepidum Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 115. ♂

Paranthidium lepidum Schwarz, 1926. Amer. Mus. Novitates 226, p. 22.

Paranthidium jugatorium lepidum Schwarz, 1934. Amer. Mus. Novitates 743, p. 6.

This is a form of *jugatorium* occurring in the southeastern states, which differs from the more typical form in the slightly larger size and in the greater extent of the yellow maculation. The differences are as follows:

FEMALE—Length 9 mm.; yellow area on clypeus more extensive, lateral facial maculae broader, not at all narrowed above, a broad continuous band across vertex, extending down cheeks to mid point of eye, a large median yellow blotch between antennae and ocelli; tubercles yellow; pleura with a transverse band, widening anteriorly to reach tubercles; axillae yellow, and scutellum black only along narrow, anterior margin; a yellow blotch below wings on metapleura; small yellow maculations at apex of femora and base of tibiae, front tibiae yellow anteriorly; wings darker, rather uniformly, deeply infuscated.

MALE—Length 9 mm.; lateral facial maculae, and those on vertex and upper face as in female; thoracic maculations much as in female, but pleural maculae less extensive; legs and abdomen similar to *jugatorium*, as also the form of the abdominal sterna and genital armature (fig. 4).

DISTRIBUTION—Kentucky and Virginia, south to Georgia, July to September.

FLOWER RECORDS—*Helenium, Helianthus, Rudbeckia* and *Silphium*.

Dianthidium Cockerell

(Fig. 1)

Anthidium subg. *Dianthidium* Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 5, p. 412. Type: (*Anthidium curvatum* Cockerell (not Smith)) = *Dianthidium sayi* Cockerell. Orig. desig.

Dianthidium Schwarz, 1926. Amer. Mus. Novitates 226, pp. 1-15. (revision)

Dianthidium Hicks, 1926. Univ. Colo. Stud. p. 249. (biology)

Dianthidium Timberlake, 1943. N. Y. Ent. Soc. Jour. 51, pp. 77-109. (revision)

Dianthidium Michener, 1948. Amer. Mus. Novitates 1381, p. 17.

The mesopleura of *Dianthidium* are partially divided into anterior and lateral faces by a rather short vertical carina. This carina originates about midway between the front coxae and the prothoracic tubercle, and terminates at the turbercle. The latter is very strongly carinate, and is prolonged along the margin of the scutum, resulting in a carina which is equal in length to that of the pleura. The scutellum is rounded, the posterior face of the propodeum completely vertical. Arolia are present between the claws; the 2nd recurrent vein terminates beyond the tip of the 2nd submarginal cell; and the mandibles are 3-dentate in both sexes. The maxillary palpi are 2-segmented. The hind coxa in the male has a robust, elongate-triangular, posterior spine, which in the female is replaced by a very short rounded tubercle.

These insects construct cells of pebbles glued together with resin. They are placed on twigs, or on roots below the soil surface, or in any available burrows or borings.

KEY TO SPECIES

Males & Females

1. Legs entirely ferruginous ..... *floridiense* Schwarz (p. 16)
   Legs black basally, becoming to some degree yellow apically 2
2. Lateral facial maculae narrowed above; anterior maculations of scutum small, well removed from tegulae ..... *simile* Cresson (p. 17)
   Lateral facial maculae only slightly narrowed above, upper end broadly rounded or truncate; anterior maculations of scutum quite large, transverse, nearly reaching tegulae ..... *curvatum* Smith (below)

Dianthidium curvatum curvatum (Smith)

Anthidium curvatum Smith, 1854. Cat. Hym. Brit. Mus. 2, p, 215. ♀

Dianthidium curvatum Schwarz, 1926. Amer. Mus. Novitates 226, p. 7.

FEMALE—Length 7 mm.; black, with yellow maculations; clypeus yellow; broad facial maculations abruptly truncate at top of eye; a narrow band along upper half of cheek; tubercles and adjacent anterior margin of scutum yellow, median third of this margin black; axillae, a narrow posterior band on scutellum and a small anterior spot on pleura, yellow; basal abdominal tergum with short, lateral maculae and a more elongate, median, yellow band; terga 2-5 with lateral, transverse maculae which are widely separated medially, posterior margin broadly emarginate; length

of face slightly greater than distance between eyes above; eyes subparallel; lateral ocelli quite small, slightly nearer margin of vertex than to eyes; clypeus slightly convex, apical margin straight; mandibles entirely black, tri-dentate, median tooth nearer apical angle than to inner angle; cheeks narrower than eyes; malar space inevident; tegulae very closely and minutely punctate, largely red, but anterior half yellow, outer margin hyaline; wings quite deeply infuscated, especially in area of marginal cell, veins piceous; coxae, trochanters and femora black, apex of femora narrowly yellow; tibiae yellow in large part but becoming more ferruginous apically, the tarsi largely testaceous or brownish; spurs yellow; hind coxa with a very short, posterior, triangular tubercle; pubescence entirely pale, very short and inconspicuous, copious only below wing bases on metapleura and propodeum; ventral scopa entirely pale ochraceous; punctures coarse, deep and distinct, close on face and cheeks, and over entire thorax; apical margins of abdominal terga impunctate, the discs coarsely punctate, punctures well separated medially on terga 2-4, close toward sides and on basal and apical terga.

MALE—Length 7 mm.; black, with yellow maculations; clypeus and mandibles yellow; broad, lateral maculations of face which end broadly at upper end of eye, lower margin of supraclypeal area, a narrow band on cheeks above upper end of eye, tubercles, adjacent anterior margin of scutum, axillae and posterior border of scutellum, all yellow; basal abdominal tergum with a median and a pair of lateral maculations; terga 2-4 with transverse bands which are slightly interrupted medially and conspicuously emarginate posteriorly, these well separated from the apical margin of each tergum, tergum 5 with a pair of small lateral spots, and tergum 7 entirely yellow except for a narrow basal band of black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli very slightly nearer eyes than to margin of vertex; clypeus slightly convex, the apical margin straight; mandibles obscurely tri-dentate, median tooth very small and obscure; cheeks narrower than eyes; tegulae very finely and closely punctate, narrowly yellowish anteriorly, otherwise more ferruginous; wings lightly infuscated, veins piceous; legs black basally, femora narrowly yellowish at apex, outer face of front and mid tibiae, basal third of hind tibiae and outer face of hind basitarsi, yellow; legs otherwise more testaceous or brownish; spurs pale yellow; hind coxae with a robust, posteriorly directed, triangular spine which is bright yellow; pubescence of entire body pale ochraceous, very short and inconspicuous, copious only beneath wing bases on metapleura and propodeum; punctures deep, distinct and quite coarse, close over lower part of face, on cheeks, and over entire thorax, slightly separated above antennae and on vertex, those on vertex, scutellum and pleura coarser than on cheeks, face below and over scutum; apical margins of abdominal terga impunctate, discs coarsely and deeply punctate, punctures well separated on terga 2-4 medially, close laterally and on basal and apical terga; tergum 7 with a median, triangular projection which is separated from the broadly truncate lateral margins by rather deep emarginations; abdominal sterna 1-5 largely exposed, 4 and 5 with conspicuous, dense and elongate pubescence medially, 6 broadly out-curved and to a large degree exposed, 7 and 8 retracted, as in *simile* (fig. 5); genital armature nearly identical with that of *simile*.

DISTRIBUTION—Missouri to North Carolina, south to Florida, April to October.

FLOWER RECORDS—*Aster, Chrysopsis, Helenium, Koellia* and *Psoralea*.

The subspecific designation of *curvatum* is made necessary by the recognition of two other subspecies in the West.

Dianthidium floridiense Schwarz

Dianthidium floridiense Schwarz, 1926. Amer. Mus. Novitates 226, p. 5. ♂ ♀.

FEMALE—Length 9 mm.; black, with ferruginous maculations and entirely ferruginous legs; clypeus, scape and basal segments of flagellum ferruginous, antennae becoming more piceous apically; lateral face marks slightly narrowed above, terminating near top of eye; vertex with a narrow band which is slightly interrupted medially and extends down below upper end of eye; tubercles, tegulae, axillae and entire scutellum ferruginous, the scutum, including median third of anterior margin, black, lateral areas adjacent to tubercles narrowly ferruginous, this extending very narrowly along lateral margins to the axillae; entire pleura and propodeum black; basal abdominal tergum, except for the somewhat darkened apical margin, entirely ferruginous; terga 2-4 with lateral, transverse maculae, which are slightly emarginate on posterior border, widely separated, but becoming broadly ferruginous at extreme sides of tergum 2, tergum 5 with a pair of small, ferruginous blotches that are quite widely separated; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and eyes; vertex

and cheeks with a carinate, posterior margin; cheeks very slightly narrower than eyes; clypeus very slightly convex, apical margin entire; mandibles dark, 3-dentate, middle tooth much nearer the apical tooth than to the inner angle; wings quite deeply infuscated, more deeply so in region of marginal cell, veins piceous; tegulae very finely and closely punctate; hind coxae with a short, triangular, spine-like tubercle; spurs pale yellow; pubescence entirely pale, very short and inconspicuous, but somewhat more elongate and copious beneath wings on metapleura and propodeum above; ventral scopa entirely whitish; punctures quite coarse, deep and distinct, close over most of head and thorax, slightly separated across vertex, those on vertex, scutellum and pleura coarser than on other areas; abdominal terga 1-5 shining, punctures well separated, becoming quite close laterally, densely crowded on 6.

MALE—Length 10-11 mm.; black, with yellow maculations on head and ferruginous maculations on thorax and abdomen, legs almost completely ferruginous; clypeus, mandibles in large part, and lateral facial maculations yellow, the lateral maculations narrowed above, terminated near top of eye where they are somewhat infused with red; scape, pedicel and segments 1 and 2 of antennae ferruginous, flagellum otherwise piceous; tubercles, tegulae, axillae and posterior half of scutellum ferruginous, pleura and propodeum entirely black; scutum, including median third of anterior margin, black, this margin otherwise narrowly ferruginous, this band extending very narrowly along lateral margins to axillae; basal abdominal tergum largely ferruginous, tergum 2 ferruginous over basal two-thirds, apical third more blackish, tergum 3 with a pair of elongate, lateral, curved maculations, and tergum 4 with widely separated, small maculae; face somewhat longer than distance between eyes above, eyes very slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex; posterior margin of vertex and cheeks distinctly carinate; cheeks considerably narrower than eyes; mandibles distinctly 3-dentate, middle tooth conspicuous, very slightly nearer apical tooth than to inner angle; tegulae very finely and densely punctate; wings deeply infuscated, somewhat violaceous, veins piceous; hind basitarsi somewhat yellowish, legs otherwise pale ferruginous or testaceous, spurs yellowish, hind coxa with a conspicuous, robust, posteriorly directed, bright yellow spine; pubescence entirely pale, very short and inconspicuous, copious only beneath wing bases and upper part of lateral faces of propodeum; punctures coarse, deep and distinct, close over most of head and thorax, slightly separated only on vertex, rather fine on lower cheeks, lower half of face, and on scutum, quite coarse on scutellum and pleura; abdominal terga shining, punctures well separated medially on terga 1-4, somewhat closer on 5, crowded on 6, close but distinct on 7 which is broadly truncate apically, with a median triangular protuberance which is separated from the truncate, lateral margins by rather deep emarginations, the plate largely testaceous, with base and median area blackish; the more basal sterna pale testaceous or ferruginous, sternum 3 with a dense brush of short pubescence occupying median third of apical margin, sternum 5 with much elongate, erect pubescence, 6 largely exposed, with thin, erect, elongate pubescence, 7 and 8 retracted (fig. 5); gonostyli of genital armature very nearly equal to penis valves in length, in contrast with *simile* (fig. 5).

DISTRIBUTION—Florida, March to November.

FLOWER RECORDS—*Bidens* and *Sabal*.

Timberlake (1943) believed *floridiense* to be merely a form of *curvatum*, but the extreme difference in coloration, with no evident intergradation, the larger size, and the more conspicuous second mandibular tooth of the male convinces this writer that it is distinct.

Dianthidium simile (Cresson)

Fig. 5

Anthidium simile Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 378. ♀ ♂.

Dianthidium simile Schwarz, 1926. Amer. Mus. Novitates 226, p. 9.

FEMALE—Length 8 mm.; black, with yellow maculations; clypeus black medially, with large yellow blotches on each side, these contiguous with lateral facial maculae which are broad below but very much narrowed above, terminating near top of eye; cheeks with a small yellow maculation above top of each eye; tubercles with a yellow spot; scutum with a small yellow maculation on anterior margin near tip of tubercle; tergulae ferruginous, with a rather large, yellow maculation; axillae largely yellow, and scutellum with a narrow, yellow border which is interrupted medially; pleura entirely black; basal abdominal tergum with a pair of lateral, yellow blotches and a narrow, median band, these widely separated; terga 2-5 with lateral, transverse maculae which are strongly emarginate on posterior border and widely separated medially; length of face subequal to distance between eyes; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex; vertex and cheeks with a very low, carinate, posterior margin; cheeks slightly narrower than eyes, clypeus slightly convex, apical margin straight

and entire; mandibles entirely black, 3-dentate, median tooth conspicuous and much nearer apical tooth than to inner angle; tegulae very finely and densely punctate; wings rather deeply infuscated, veins piceous; coxae and trochanters black, femora black except for small, apical, yellow maculations, front and mid tibiae largely yellow on outer face except at apex, and hind tibiae with a more restricted, basal, yellow maculation, tarsi and remainder of tibiae brownish-ferruginous; spurs yellowish to dull testaceous; hind coxa with a low, triangular, spine-like tubercle; pubescence entirely pale, very short and inconspicuous, to some degree more elongate and copious beneath wing bases on upper part of metapleura and propodeum; ventral scopa entirely pale ochraceous; punctures coarse, deep and distinct, close over entire head and thorax, being slightly separated only on vertex; punctures slightly separated on basal, abdominal tergum medially, becoming quite close at extreme sides, those on terga 2-5 somewhat separated medially, but becoming close laterally, apical margins narrowly impunctate, punctures of tergum 6 densely crowded.

MALE—Length 8-9 mm.; black, with yellow maculations; outer face of mandibles and entire clypeus yellow, lateral face marks yellow, more or less triangular, ending very narrowly toward upper end of eye; cheek with a very small, yellow spot back of eye at top of head; tubercles with a small yellow blotch, and tegulae with an anterior, yellow maculation; scutum with a pair of very small, anterior spots, axillae with small yellow spots and scutellum very narrowly rimmed with yellow on each side; otherwise thorax entirely black; basal abdominal tergum with a pair of short, lateral maculations and a median, more elongate but conspicuous spot; terga 2-5 with lateral, transverse, elongate maculations which are broadly emarginate posteriorly. and nearly meet medially, tergum 7 largely yellow, with only the narrow base black; face somewhat longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex; vertex and cheeks with a sharp but rather low, carinate, posterior rim; clypeus broadly convex, apical margin straight; mandibles obscurely 3-dentate, with a very low and inconspicuous middle tooth; tegulae very finely and densely punctate; wings rather deeply infuscated, veins piceous; coxae, trochanters and femora black, but mid and hind femora, with small, yellow marks apically; outer face of front and mid tibiae yellow, and hind border, base and apex of hind tibiae yellow, otherwise black; fore and hind basitarsi yellow, the mid tarsi and the more apical tarsal segments of the others, more brownish; all spurs, and apical, robust spines of hind coxae, bright yellow; pubescence very short and inconspicuous, entirely pale, somewhat more dense beneath wing bases on upper part of metapleura and propodeum; punctures coarse, deep and distinct, close over entire head and thorax; punctures well separated medially on abdominal terga 2-4, somewhat closer on 1 and 5, dense on 6 and quite close on all; tergum 7 broadly truncate, with a median, triangular protuberance which is slightly separated from lateral areas by shallow emarginations; basal sterna dark, sternum 3 with a median, apical, dense brush of moderately elongate pubescence, and sternum 5 with a fringe of quite elongate pubescence, 6 largely exposed, thinly pubescent, 7 and 8 retracted; genital armature as shown (fig. 5).

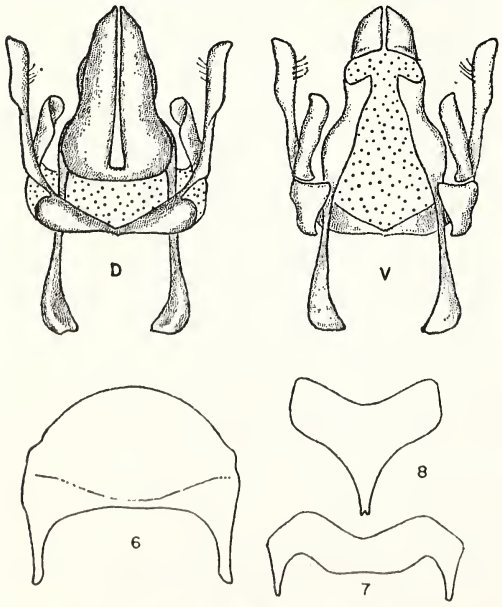


Figure 5
Dorsal and ventral views of genital armature and sterna 6-8 in males of *Dianthidium simile*.

DISTRIBUTION—Minnesota to Ontario and Maine, south to Georgia, July to September.

FLOWER RECORD—*Aster*.

Anthidiellum Cockerell

(Fig. 1)

Anthidium subg. *Anthidiellum* Cockerell, 1904. South. Calif. Acad. Sci. 3, p. 3. Type: *Anthidium strigatum* Panzer. Orig. desig.

Anthidium subg. *Ceri-anthidium* Friese, 1923. Die Europ. Bienen. p. 304. Type: *Anthidium strigatum* Panzer. Desig. by Cockerell, 1925.

Cerianthidium Cockerell, 1925. Calif. Acad. Sci. Proc. (4) 14, p. 361. (Emend.)

Anthidiellum Schwarz, 1926. Amer. Mus. Novitates 226, pp. 15-19. (revision)

Anthidiellum Michener, 1948. Amer. Mus. Novitates 1381, p. 23.

In *Anthidiellum* the mesopleura are vertically carinate, dividing the area into an anterior face and a lateral, more coarsely sculptured face. This carina originates at the front coxa and extends to the anterior margin of the prothoracic tubercle, which also is sharply carinate. The scutellum has a straight and elongate posterior margin which protrudes conspicuously over the completely vertical posterior face of the propodeum. The mandibles are 4-dentate in the females, 3-dentate in the males. The maxillary palpi are 2-segmented; and the 2nd recurrent vein of the front wing terminates at the tip of the 2nd submarginal cell. Sterna 5-8 in the males are retracted and somewhat modified.

The cells in this group are attached to rocks or to vegetation.

KEY TO SPECIES

1. Males 2
   Females 5
2. Segment 7 of abdomen triangular in outline; base of abdomen deep red .... *perplexum* Smith (p. 21)
   Segment 7 broad and very short, apical margin sinuate 3
3. Lateral face marks extending along inner margin of eye nearly to vertex 4
   Lateral face marks abruptly truncate above, terminating just above level of antennae .... *notatum boreale* Robertson (p. 20)
4. Maculations yellow; basal abdominal tergum with widely separated, lateral, yellow blotches .... *notatum notatum* Latreille
   Maculations ferruginous; basal abdominal tergum almost entirely ferruginous, with only a narrow, subapical, transverse, blackish band ..... *notatum rufimaculatum* Schwarz (p. 21)

5(1). Area between lateral ocelli swollen and impunctate 6
   Area between lateral ocelli well punctured, only slightly swollen .... *perplexum* Smith (p. 21)
6. Clypeus entirely black; lateral facial maculae abruptly truncate at level of antennae ..... *notatum* (?) *boreale* Robertson (p. 20)
   Clypeus, in part, yellow or red 7
7. Maculations yellow; basal abdominal tergum with widely separated, lateral, blotches .... *notatum notatum* Latreille
   Maculations ferruginous; basal abdominal tergum ferruginous, with only a relatively narrow, apical, black band . *notatum rufimaculatum* Schwarz (p. 21)

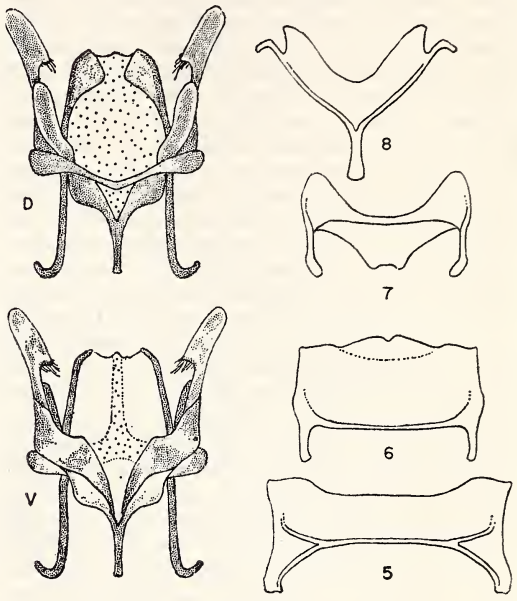


Figure 6
Dorsal and ventral views of genital armature and sterna 5-8 in males of *Anthidiellum notatum*.

Anthidiellum notatum notatum (Latreille)

(Fig. 6)

Anthidium notatum Latreille, 1809. Mus. Nat. Hist. Ann. 13, pp. 48 & 231. ♂.

Anthidium notatum Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 376. ♀ ♂.

Anthidiellum notatum Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 394.

FEMALE—Length 8 mm.; black, with yellow maculations; clypeus in large part, and adjacent margin of supraclypeal area, yellow; lateral facial maculae yellow, extending broadly nearly to top of eye; posterior margin of vertex with a yellow band terminating just above top of eye; tubercles and adjacent margin of scutum broadly yellow, the median third or more of this margin black; axillae, an adjacent small spot at lower lateral angle of scutum, and scutellum in large part, yellow; median, anterior area of scutellum black; mandibles, apical margin of clypeus, entire

cheeks and pleura, black; legs black basally, tibiae in large part yellow, hind pair becoming ferruginous toward apex, tarsi largely brownish-ferruginous, but front tarsi somewhat yellowish; basal abdominal tergum black, with a pair of rather short but broad maculae at each extreme side, tergum 2 with a pair of elongate, slightly curved, basal, transverse, yellow bands which nearly meet at midline; terga 3-5 with rather widely separated, rectangular, yellow blotches; face somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli considerably nearer margin of vertex than to eyes; posterior margin of vertex subcarinate; cheeks very much narrower than eyes; clypeus somewhat convex, apical margin slightly thickened, only slightly out-curved; mandibles robust, quite distinctly 4-dentate, the teeth low; tegulae reddish-testaceous, with a yellow, anterior blotch, very minutely and quite closely punctate; wings rather deeply infuscated, veins piceous; front and middle spurs very short, yellowish-hyaline, hind spurs dull brownish-testaceous, nearly as long as the basitarsi; pubescence extremely short, thin, entirely pale, hardly evident on dorsum of thorax and on abdominal terga, ventral scopa entirely whitish; punctures quite coarse, deep and distinct, quite close below ocelli, closely crowded on cheeks, area between ocelli swollen and impunctate, with a deep, median impression; punctures very coarse and quite close on pleura, scutellum and axillae, somewhat less coarse and more definitely separated but still quite close on scutum; punctures distinct, deep and rather close on abdominal terga medially, becoming more coarse and close at extreme sides, apical margins narrowly shining and impunctate, depressed toward extreme sides; tergum 6 densely and finely rugoso-punctate, surface rather deeply impressed just before apical margin.

MALE—Length 7-8 mm.; black, with yellow maculations; outer face of mandibles, entire clypeus, lower and lateral areas of supraclypeal area and adjacent, lateral, facial maculae terminating rather narrowly near upper part of eyes, yellow; posterior margin of vertex narrowly yellow, ending just above top of eye; tubercles, an anterior spot on each tegula, axillae in large part, and scutellum posteriorly, yellow; anterior margin of scutum adjacent to tubercle with a yellow band, median third or more of this margin black; pleura, cheeks and upper part of face black; basal abdominal tergum black, with large yellow blotches at each extreme side, tergum 2 with transverse, slightly curved, sub-basal, yellow maculations which nearly meet medially, terga 3-5 with submedian, rather widely separated, rectangular blotches and small, yellow maculations at extreme sides; face considerably longer than distance between eyes above; eyes convergent below; lateral ocelli somewhat nearer margin of vertex than to eyes; cheeks very much narrower than eyes; clypeus slightly convex, apical margin nearly straight; mandibles distinctly 3-dentate, teeth black; tegulae reddish, with minute and quite close punctures; wings deeply infuscated, veins piceous; legs in large part ferruginous, but front and mid tibiae on outer face, and basal spot on hind tibiae, yellow; all basitarsi yellow, the more apical tarsal segments ferruginous; spurs yellowish, front and mid pair very short, more hyaline, hind pair somewhat more elongate but not approaching basitarsi in length; punctures coarse, deep and distinct, quite close between ocelli and antennae, somewhat more widely separated below, densely crowded on cheeks; area between ocelli swollen and impunctate but with a deep, median impression; punctures coarse and distinct, not crowded on pleura, axillae and scutellum, the scutum shining, punctures well separated in central part of disc posteriorly, becoming finer and closer anteriorly; basal tergum closely, deeply and distinctly punctate across entire disc, punctures on terga 2-5 slightly more widely separated and coarse, apical margins of discs narrowly impunctate, somewhat reddened, becoming depressed toward extreme sides; tergum 6 black except for the yellowish, lateral margins and narrowly along posterior margin, with a pair of low, submedian, apical protuberances; tergum 7 broad and quite short, slightly emarginate medially, coarsely and quite closely punctate; sterna 1-4 largely exposed, with rather elongate and thin, whitish pubescence; sterna 5-8 largely retracted, form as shown (fig. 6); gonostyli of genital armature elongate and quite narrow, much exceeding penis valves at apex.

DISTRIBUTION—Illinois to Massachusetts, south to Florida and Mississippi, April to September.

FLOWER RECORDS—*Afzelia, Baptisia, Chrysopsis, Desmodium, Erigeron, Eupatorium, Galactia, Helianthus, Melilotus, Monarda, Phaseolus, Psoralea Solidago* and *Trifolium.*

Anthidiellum notatum boreale (Robertson)

Dianthidium boreale Robertson, 1902. Canad. Ent. 34, p. 323. ♂

Anthidiellum boreale Swenk, 1914. Univ. Nebr. Studies 14, p. 32.

Anthidiellum notatum boreale Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 394.

Dianthidium boreale Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

The material available for study of this form is very inadequate. The holotype male has been seen. It is very similar to typical *notatum*, but the axillae have a very much reduced maculation, being almost entirely black. A female at hand, from northern Illinois may represent that sex for this form. It differs from the typical *notatum* female in the reduction of the swollen, impunctate area between the ocelli, this area being nearly flat and with a few, scattered punctures; the clypeus and axillae in this specimen are entirely black, otherwise the maculation is very similar to that of *notatum*.

DISTRIBUTION—Nebraska and Illinois.

FLOWER RECORD—Robertson (1929) records this subspecies on *Verbena stricta*.

Anthidiellum notatum rufimaculatum Schwarz

Anthidiellum notatum var. *rufimaculatum* Schwarz, 1926. Amer. Mus. Novitates 226, p. 18. ♂ ♀.

Anthidiellum notatum rufimaculatum Schwarz, 1928. N. Y. Ent. Soc. Jour. 36, p. 395. (biology)

This form is nearly or quite identical with typical *notatum* structurally, differing chiefly in the color of the maculated areas, which are ferruginous, with entirely ferruginous legs. The color differences for the two sexes are as follows:

FEMALE—Lateral areas on clypeus, adjacent margin of supraclypeal area, and lateral facial maculae ending broadly nearer upper end of eye, ferruginous; posterior margin of vertex with a broad ferruginous band, extending down to upper third of eye on cheeks; scape, pedicel and segments 1 and 2 of flagellum reddish-testaceous, the more apical segments piceous; tubercles ferruginous and adjacent margin of scutum quite broadly ferruginous, extending down each side nearly to axillae; axillae entirely, and scutellum in large part, ferruginous; tegulae reddish-testaceous; pleura and propodeum entirely black; basal half of abdominal tergum 1 entirely ferruginous, apical half across central portion of disc, black; tergum 2 largely ferruginous basally, but the curved and slightly separated, more yellowish maculae faintly visible within the ferruginous area; terga 3-5 with submedian, rather widely separated, rectangular, ferruginous blotches, lateral margins of these terga entirely black.

MALE—Clypeus and mandibles, except teeth, entirely yellow, lateral facial maculae yellow in large part, but terminated near top of eye by a more ferruginous area, and supraclypeal area yellow in large part, but tinged with ferruginous above; posterior margin of vertex broadly ferruginous, the band reaching upper third of eye on cheeks; antennae largely reddish-testaceous, but becoming somewhat more brownish apically; tegulae yellowish-ferruginous, adjacent area of scutum rather broadly ferruginous, extending down each side nearly to axillae; axillae and scutellum entirely ferruginous; pleura entirely black, posterior face of propodeum with a pair of extensive, yellow blotches; legs yellowish-ferruginous, but basitarsi more definitely yellowish on outer face; basal abdominal tergum almost entirely ferruginous, with a subapical, narrow, blackish band extending nearly from one side to the other; tergum 2 with a somewhat similar, slightly broader and more conspicuous dark band; terga 3-5 with submedian rather widely separated, rectangular blotches, and the extreme lateral, tuberculate margins of each tergum furruginous; tergum 6 black medially, ferruginous laterally and tergum 7 almost entirely ferruginous.

DISTRIBUTION—Florida, March to December.

FLOWER RECORD—*Rhus*.

Anthidiellum perplexum (Smith)

(Fig. 7)

Anthidium perplexum Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 214. ♀ ♂.

Anthidium perplexum Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 377. ♀ ♂.

FEMALE—Length 8 mm.; black, with yellow and ferruginous maculations, legs largely ferruginous; lateral facial maculae bright yellow, filling area between clypeus and eyes and ending broadly just above level of antennae, a limited area beneath each antennal fossa more ferruginous; scape, pedicel and segments 1 and 2 of antennae ferruginous, the more apical segments piceous; vertex with a narrow posterior, yellowish band that terminates just beyond upper end of eye; tubercles and an adjacent anterior band on scutum, reddish-yellow, median third of this margin black; axillae, and scutellum in large part ferruginous, the latter blackish medially and along anterior margin; clypeus, mandibles, upper part of face, cheeks, and entire pleura and propodeum, black; basal abdominal tergum

largely dark reddish, with bright yellow maculations at each extreme side; tergum 2 with a narrow, sub-basal, elongate and slightly curved, yellow maculation which is bordered posteriorly with a narrow area of ferruginous; terga 3 and 4 with a pair of widely separated, more or less rectangular, yellow blotches, which are more basal in location; abdomen otherwise black; face considerably longer than distance between eyes above; eyes distinctly converging below; lateral ocelli somewhat nearer margin of vertex than to eyes; posterior margin of vertex subcarinate; cheeks much narrower than eyes; clypeus slightly convex, apical margin broadly rounded; mandibles robust, 4-dentate, teeth rather low; wings deeply infuscated, veins piceous; tegulae ferruginous, very finely and closely punctate; tibiae quite coarsely, deeply and closely punctate on outer faces, the front and middle spurs very short, yellowish-hyaline, hind spurs more testaceous, nearly as long as the basitarsi; pubescence extremely short and thin, apparently entirely pale, hardly evident on dorsum of thorax and abdominal terga, more evident beneath and on legs; ventral scopa entirely whitish; punctures quite deep and distinct, quite coarse and close over most of head, crowded on clypeus and below ocelli, crowded and very coarse and deep on pleura; scutum dull, punctures rather fine, distinctly but not widely separated over the disc, those in central area becoming quite close but not crowded laterally; punctures of axillae and scutellum very coarse, deep and close; abdominal terga shining, punctures of basal tergum uniformly close, rather coarse, becoming somewhat finer toward the very narrow, apical, impunctate rim, more widely separated on terga 2-4 medially, becoming more closely and deeply punctate laterally and becoming densely crowded on 6, which is rather deeply impressed just before apical margin medially, slightly emarginate on each side.

MALE—Length 9 mm.; black, with yellow and ferruginous maculations, legs largely ferruginous; entire clypeus, outer face of mandibles, lateral maculae, and supraclypeal area in large part, yellow, the facial maculae ending broadly just above base of antennae; antennal scape reddish-piceous, flagellum more blackish; vertex with a yellow, posterior band that extends just beyond upper end of eye on each side; tubercles reddish-yellow, the adjacent, anterior margin of scutum with a yellow band, median third of this margin black; axillae ferruginous, posterior half of scutellum more yellowish, but becoming blackish anteriorly and toward median line; pleura, cheeks in large part, and upper part of face, black; basal abdominal tergum largely ferruginous, with large yellow blotches on each extreme side; tergum 2 with elongate, transverse, sub-basal, yellow bands which are slightly curved and rather broadly margined with ferruginous posteriorly, becoming brighter yellow at extreme sides; terga 3-5 with a pair of rather widely separated, angulate, yellow blotches, terga 3-6 with small yellow maculations at each extreme side, tergum 7 narrowly margined with yellow; legs largely red, but hind basitarsi more yellowish, and anterior face of front tibiae yellowish; face considerably shorter than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and margin of vertex; cheeks very much narrower than eyes; clypeus only very slightly convex, apical margin very broadly and evenly rounded; mandibles rather narrow apically, conspicuously 3-dentate, teeth black; tegulae ferruginous, very minutely and quite closely punctate, outer rims becoming impunctate and translucent; wings quite deeply infuscated, veins blackish; outer face of tibiae coarsely, deeply and closely punctate, front and mid spurs yellowish-hyaline and extremely short, hind spurs more testaceous, nearly as long as the basitarsi; pubescence extremely short and thin, entirely pale, hardly evident on dorsum of thorax and abdominal terga, somewhat more copious on legs, forming a rather thin posterior fringe on front and middle tibiae and tarsi; punctures quite deep and distinct in general, densely crowded between ocelli and antennae, rather well separated on lower part of face and on vertex, and very close and coarse on cheeks; close and very coarse on pleura and scutellum, somewhat finer on scutum where they are distinctly but not widely separated, the surface rather dull; abdominal terga shining, punctures on terga 1 and 2 rather fine, well but not widely separated, becoming somewhat coarser laterally, terga 3-5 somewhat more coarsely punctate, punctures distinctly but not widely separated medially, becoming close and coarse laterally, quite close on 6, close and rather fine on 7; tergum 7 rather broadly rounded, with an obtuse, median angle, becoming nearly triangular; tergum 6 with a pair of low, subapical protuberances; sterna 1-4 largely exposed, with considerable elongate, rather dense, pale pubescence, sterna 5-8 retracted, 5 broadly incurved across apical margin, rather densely pubescent at each extreme side, 6-8 as shown (fig. 7); gonostyli of genital armature rather broadly expanded apically.

DISTRIBUTION—North Carolina to Florida, throughout the year in Florida, elsewhere April to October.

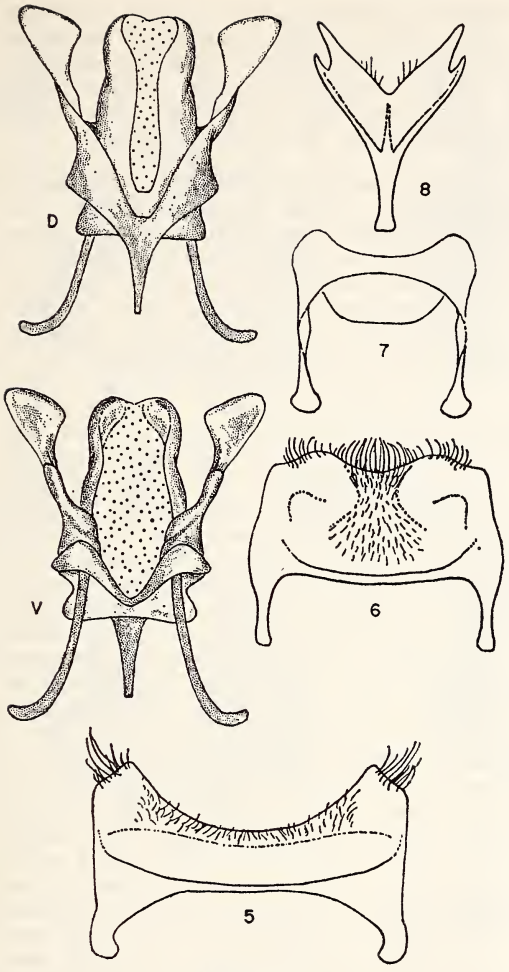


Figure 7
Dorsal and ventral views of genital armature and sterna 5-8 in males of *Anthidiellum perplexum*.

FLOWER RECORDS—*Afzelia, Amorpha, Bidens, Chrysopsis, Desmodium, Erigeron, Hypericum, Ilex, Kuhnistera, Linaria, Monarda, Ocimum, Polygonum, Psoralea, Ptilimnium, Rhus* and *Solidago*.

Heteranthidium Cockerell

(Fig. 1)

Heteranthidium Cockerell, 1904. Ent. News 15, p. 292. Type: *Anthidium dorsale* Lepeletier. Monob. and orig. desig.

Heteranthidium Schwarz, 1926. Amer. Mus. Novitates 218, pp. 1-15. (revision)

Heteranthidium Michener, 1948. Amer. Mus. Novitates 1381, p. 9.

Heteranthidium is a genus of large, robust, usually conspicuously maculated bees. The maxillary palpi are 3-segmented; arolia are present; the mandibles in males are 3-dentate, while in the females they are broadened apically, with one or two slight indentations, but without distinct teeth. The pleura are not carinate, and the tubercles have a very low, inconspicuous carina or none. Sterna 6-8 in males are retracted and modified, and the genital armature is robust and shows marked differences between the included species. The 2nd recurrent vein terminates very close to the tip of the 2nd submarginal cell, being either interstitial with the transverse cubitus, or slightly within or beyond the tip of the cell.

KEY TO SPECIES

Females

1. Head and thorax entirely black; abdominal terga with narrow, ivory, apical bands ..... *ridingsi* Cresson (p. 28)
   Head and thorax to some degree maculated; abdominal bands subapical in position . . 2
2. Pleura entirely black; scutum entirely black, or with at most a pair of yellow maculae adjacent to tegulae; tubercles not carinate ..... *zebratum* Cresson (p. 29)
   Scutum with conspicuous, lateral, yellow stripes and pleura usually maculated . . 3
3. Scutum with submedian, yellow stripes, in addition to the pair of lateral maculae ..... *dorsale* Lepeletier (p. 26)
   Scutum not maculated near center of disc 4
4. Mandibles and tergum 6 of abdomen entirely black; tubercles carinate ..... *crassipes* Cresson (p. 24)
   Mandibles and tergum 6 of abdomen yellow-maculated; tubercles not carinate ..... *fontemvitae* Schwarz (p. 27)

Males

1. Thorax entirely black; abdominal terga with narrow, ivory, apical bands ..... *ridingsi* Cresson (p. 28)
   Thorax to some degree maculated; abdominal bands subapical in position 2
2. Abdominal sternum 3 with a pair of short, slender spines ..... *fontemvitae* Schwarz (p. 27)
   Sternum 3 not spinose 3
3. Abdominal tergum 7 nearly straight apically ..... *crassipes* Cresson (p. 24)
   Tergum 7 angulate 4

4. Tibiae entirely bright yellow .... *dorsale* Lepeletier (p. 26)
Tibiae largely black, with small, yellow maculations at base and apex .... *zebratum* Cresson (p. 29)

Heteranthidium crassipes (Cresson)

(Fig. 8)

Anthidium crassipes Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 112. ♀.

FEMALE—Length 10 mm.; black, with yellow maculations; clypeus except the narrow, apical margin, a triangular maculation on supraclypeal area, lateral facial maculae reaching top of eye, and a pair of small, oblong spots on each side of vertex, yellow; a small yellow spot on tubercle; anterior third of tegulae, an L-shaped mark on scutum extending from anterior margin to axillae, the entire axillae, and posterior margin of scutellum, yellow; pleura with a large, anterior, yellow blotch; mandibles, upper part of face in large part, and median basal part of scutellum, black; coxae, trochanters and femora largely ferruginous, tibiae and basitarsi more yellowish, the more apical tarsal segments becoming reddish; spurs testaceous; abdominal terga with entire, transverse, yellow bands, these gradually and strongly narrowed toward midline, filling entire disc at each side, the apical depressed rims narrowly black; tergum 6 entirely black; face slightly longer than distance between eyes; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex; cheeks much narrower than eyes; clypeus only slightly convex, rather short, apical margin with a shallow, median, emarginate area and very minute crenulations on each side; mandibles with very low, scarcely perceptible teeth on the dentate margin; tegulae somewhat shining, very minutely and closely but quite deeply punctate; wings lightly infuscated, veins piceous; tubercles strongly carinate; hind basitarsi nearly as broad as their tibiae, length no more than twice the greatest breadth; pubescence very short and inconspicuous, entirely pale, barely visible on dorsum of thorax and abdominal terga, more dense on face, cheeks and pleura, but still quite short and thin; scopa entirely pale ochraceous; tergum 6 in large part covered with dense, appressed tomentum; punctures quite coarse, deep and distinct, close and rather fine around antennae, somewhat more coarse and distinct on maculated areas, and more widely separated on vertex, becoming close on cheeks below; punctures rather coarse and quite close on pleura anteriorly and above, becoming finer and closer below and posteriorly, those on scutum and scutellum uniformly very close, coarse and deep, almost crowded; abdominal terga 1-3 quite coarsely, deeply and uniformly punctate, punctures slightly separated near midline, becoming somewhat closer laterally and closer on terga 4 and 5, tergum 6 with minute and densely crowded, barely visible punctures.

MALE—Length 9 mm.; black, with yellow maculations; clypeus, mandibles, apical third of supraclypeal area, scape below, and lateral facial marks extending narrowly to top of eye, yellow; vertex with a pair of small, oblong, yellow spots on each side and a smaller, more indefinite spot on upper part of cheeks; scutum with a pair of lateral, yellow bands, extending from median third of anterior margin along side to axillae, the axillae and postero-lateral half of scutellum yellow, median half black; an oblong, yellow spot on pleura anteriorly; tubercles yellow in large part, tegulae with a pale yellow, anterior blotch; coxae, trochanters and femora ferruginous, tibiae more yellowish, basitarsi pale yellow, and the more apical tarsal segments more ferruginous; spurs pale yellow; abdominal terga 1-6 with transverse yellow bands, these broad laterally, strongly narrowed medially, that on tergum 1 slightly interrupted; apical margin of terga narrowly depressed and shining, reddish in color; band on tergum 6 occupying two-thirds of plate, tergum 7 narrowly yellow apically, the remainder ferruginous; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks somewhat narrower than eyes; mandibles 3-dentate, teeth black in contrast with the yellow outer face; clypeus slightly protuberant, apical margin nearly straight but with a barely perceptible, median, emarginate area delimited by a pair of minute tubercles; tegulae somewhat shining, with very fine and rather close but indefinite punctures; wings subhyaline, veins more piceous; pubescence entirely pale, very short and thin, somewhat yellowish above, very inconspicuous on dorsum of thorax and on abdominal terga, more dense around antennae and on cheeks, pleura and propodeum; punctures deep and distinct, close in large part, quite fine below ocelli, somewhat more widely separated on maculated areas and well separated and rather fine on vertex, becoming close and fine on cheeks below; rather coarse and well separated on pleura anteriorly, adjacent to maculation, becoming fine and close below; coarse and uniformly close over scutum and scutellum, intervening lines somewhat shining; front basitarsi very small and inconspicuous, mid basitarsi elongate, narrow, slightly curved, fully twice as long as hind basitarsi which are much shorter than following joints

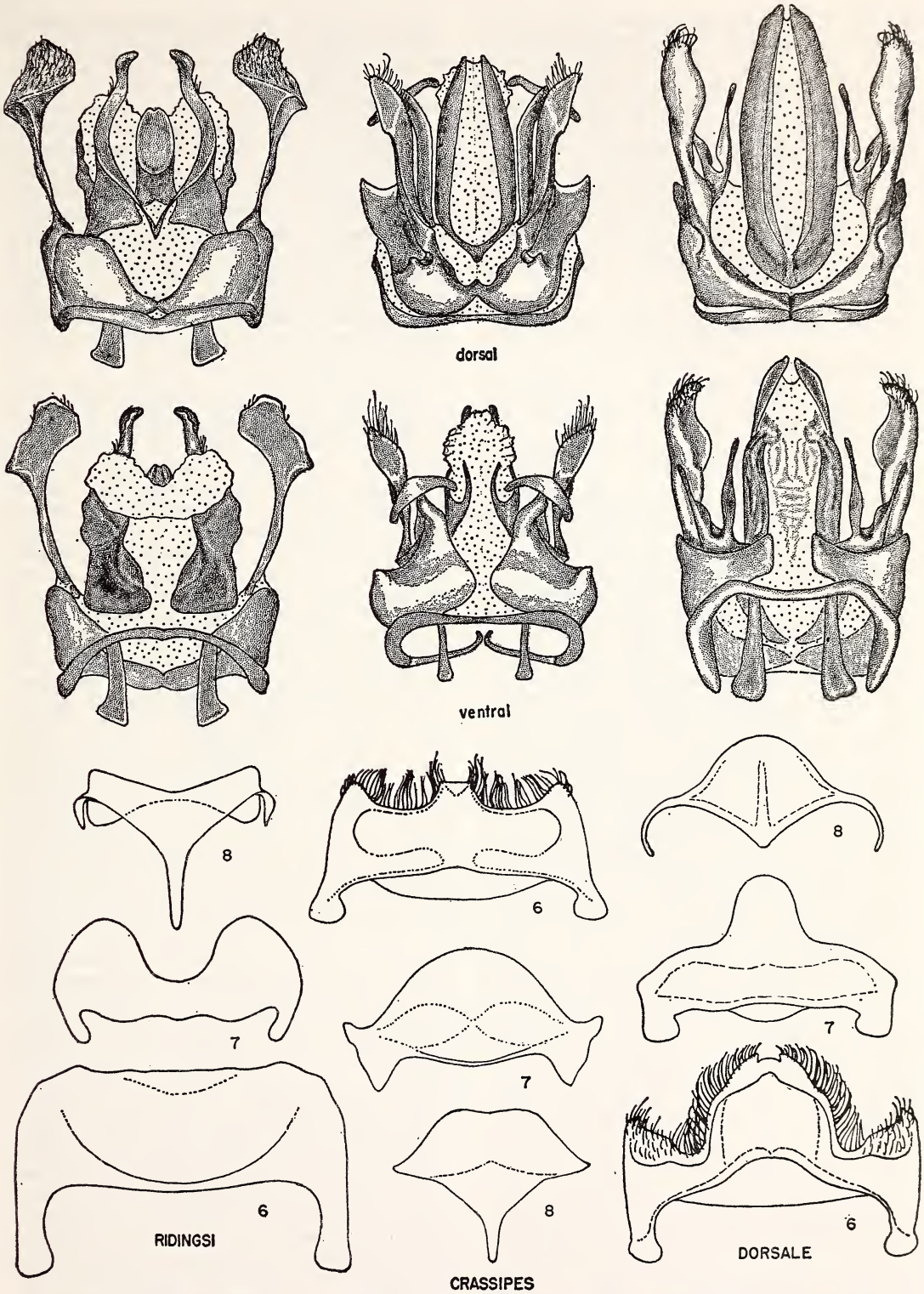


Figure 8—Dorsal and ventral views of genital armature and sterna 6-8 in males of *Heteranthidium*.

combined and not much more than one-third length of tibia; abdominal terga shining, punctures deep and distinct, well separated medially on terga 1-4, becoming quite close and coarser at extreme sides, quite close on terga 5 and 6; tergum 7 nearly straight apically, very slightly convex; sterna 1-3 largely exposed, 2 and 3 with dense pubescence which becomes more elongate toward sides; sterna 4-8 retracted and hidden, form as shown (fig. 8); genital armature as shown.

DISTRIBUTION—North Carolina to Florida, July.

Heteranthidium dorsale (Lepeletier)

(Fig. 8)

Anthidium dorsale Lepeletier, 1841. Hist. Nat. Ins., Hym. 2, p. 384. ♂.

Anthidium dorsale Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 381. ♂.

Anthidium harbecki Crawford, 1910. Ent. News 21, p. 456. ♀.

FEMALE—Length 13 mm.; black, with yellow maculations; clypeus, a broad triangular part of supraclypeal area, lateral face marks extending narrowly nearly to top of eye, and a large area on cheeks, yellow; lateral margins of scutum and a pair of submedian, L-shaped, anterior marks directed posteriorly, axillae in large part, and the broad posterior margin of scutellum, all yellow; tubercles in large part yellow, a small yellow spot on tegulae and a large anterior yellow blotch on pleura; coxae, trochanters and femora largely ferruginous, but front femora margined below with a conspicuous yellow stripe, and mid-femora with a small but elongate yellow spot on lower margin; tibiae yellow on outer face, more ferruginous on inner and posterior faces; mid and hind basitarsi largely yellow, almost as wide as their tibiae, the front basitarsi and the more apical tarsal segments of all legs, ferruginous; spurs brownish-testaceous; terga 1-5 with transverse, yellow bands, broad laterally, gradually narrowed medially, being slightly interrupted on basal tergum, these subapical in position, the narrow, depressed apical margins black; tergum 6 with a pair of very small, lateral, yellow spots; face somewhat longer than distance between eyes; eyes subparallel; lateral ocelli rather widely removed from margin of vertex, but subequally distant from eyes and each other; cheeks about equal to eyes in width; mandibles broadly expanded apically, the dentate edge with one or two barely perceptible teeth; clypeus rather flat, apical margin with a pair of submedian denticles delimiting a narrow emargination; tegulae finely and densely punctate; wings faintly infuscated, veins piceous; pubescence very short, thin and inconspicuous, entirely pale, barely evident on head above, dorsum of thorax, and abdominal terga, more evident around antennae, on cheeks below and on pleura; ventral scopa entirely yellowish-white; punctures deep and distinct, rather coarse, close and finer below ocelli, more distinct and coarse on maculated areas of face and on vertex, quite close on cheeks; close, deep and distinct on pleura; scutum and scutellum rather coarsely and densely rugoso-punctate; abdominal terga shining, punctures rather fine, somewhat separated along midline, becoming somewhat coarser and closer toward sides, tergum 6 very densely and finely rugoso-punctate, median area somewhat produced and broadly rounded; sternum 6 very broad, abruptly truncate apically.

MALE—Length 14 mm.; black, with yellow maculations; clypeus, mandibles except teeth, lower half of supraclypeal area, anterior surface of scape, lateral facial maculae extending nearly to top of eye, and a rather small spot back of upper end of eye, yellow; lateral margins of scutellum, a pair of longitudinal, submedian, L-shaped maculations on scutum anteriorly, axillae in part, and broad posterior margin of scutellum, all yellow; tubercles margined with yellow and anterior third of tegulae yellow; pleura with a rather small anterior yellow blotch; legs more ferruginous basally but front and mid femora margined with yellow below, hind pair with an apical, yellow spot; all tibiae bright yellow on outer face, more or less ferruginous on the remaining two faces, and all basitarsi yellow, middle pair elongate, hind pair no more than half this length, and front pair extremely short, barely evident; spurs testaceous; abdominal terga 1-5 with transverse yellow bands that are very broad laterally, occupying most of the disc, but strongly narrowed in center, that on 5 relatively broad across entire plate, and 6 almost entirely yellow, with only a very narrow basal margin dark; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, much farther from margin of vertex; cheeks slightly narrower than eyes; mandibles 3-dentate; clypeus rather flat, apical margin nearly straight, with a pair of submedian, dark denticles which delimit a shallow, median, emarginate area; tegulae deeply and quite closely punctate; wings subhyaline, veins and stigma more brownish-ferruginous; pubescence very short, thin and inconspicuous, entirely pale, somewhat ochraceous on head and thorax above, more whitish and dense around antennae, on cheeks below, on pleura and on upper portion of propodeum; punctures quite deep and distinct, very fine just below ocelli,

but becoming quite coarse and slightly separated on clypeus and other maculated areas, rather distinctly separated but still quite close on vertex and cheeks; punctures rather fine and close on pleura posteriorly and below, becoming somewhat coarser and more distinctly separated anteriorly and above; scutum and scutellum dull, densely and rather coarsely rugoso-punctate; abdominal terga somewhat shining, punctures deep and distinct, quite close in general, tergum 6 almost rugoso-punctate; tergum 7 largely yellow, with a median, triangular, produced area which overlies the relatively straight, apical margin, punctures very close but rather deep and distinct; abdominal sterna 1-4 rather fully exposed, basal tergum with a ventral, carinate projection which is bidentate apically, sterna 3 and 4 densely pubescent, hairs becoming more elongate on each extreme side; sterna 5-8 retracted, form as shown (fig. 8); gonostyli of genital armature rather gradually dilated apically, not quite equalling penis valves in length, the cuspis and digitus of the volsellae evident as elongate, spine-like parts interposed between the gonocoxites and base of the penis valves.

DISTRIBUTION—New Jersey to Alabama, August and September.

FLOWER RECORD—*Strophostyles.*

Heteranthidium fontemvitae Schwarz

(Figs. 9 & 10)

Heteranthidium fontemvitae Schwarz, 1926. Amer. Mus. Novitates 218, p. 8. ♂ ♀

FEMALE—Length 13 mm.; black, with yellow maculations; clypeus, a spot on outer face of mandibles, lateral face marks extending very narrowly nearly to top of eye, an elongate stripe on cheeks just back of eye, and an oblong spot on each side of vertex, yellow; lateral margins of scutum, a spot on axillae, and posterior margin of scutellum, yellow; tubercles with a very small yellow spot and outer anterior third of tegulae yellow; pleura with a small, anterior, yellow spot; legs dark basally, more or less reddish, becoming more ferruginous apically, but lower posterior margin of front and mid femora narrowly yellow, a yellow stripe from base to near the tip on outer face of front tibiae, mid tibiae with a basal yellow spot and hind tibiae yellow along posterior margin from base to apex, hind basitarsi yellow in part; spurs testaceous; terga 1-5 with entire, transverse, yellow bands, these very narrow medially and with a rather conspicuous, anterior emargination toward each side; apical rims of terga slightly depressed and entirely black; tergum 6 with a broadly V-shaped, median, yellow mark; face considerably longer than distance between eyes; eyes nearly parallel; lateral ocelli widely removed from posterior margin of vertex and somewhat nearer eyes than to each other; cheeks subequal to eyes in width; mandibles broadened apically, teeth barely evident; clypeus slightly convex, apical margin straight but minutely denticulate; tegulae very finely and closely punctate; wings lightly infuscated, somewhat more deeply so apically and in region of marginal cell, veins piceous; pubescence entirely pale, thin and quite short, very inconspicuous on upper portion of head, thorax and abdominal terga, more dense and conspicuous on thorax laterally and posteriorly, ventral scopa entirely yellowish-white; punctures rather deep but quite close and rather fine in general, slightly separated just below ocelli, and cheeks shining with minute and rather sparse punctures posteriorly, becoming closer toward eyes; pleura very finely and closely punctate, scutum and scutellum somewhat more coarsely but densely rugoso-punctate; abdominal terga somewhat shining, but punctures fine and uniformly close, those tergum 6 minute and densely crowded.

MALE—Length 14 mm.; black, with yellow maculations; clypeus, mandibles except the teeth, lateral facial maculae terminating very narrowly on eye just above antennae, a small spot on each side of vertex, and a narrow mark extending from upper third of eye to inferior limit of cheeks, yellow; tubercles with a very minute yellow spot laterally, scutum narrowly margined with yellow on each side and tegulae in large part yellow; coxae and trochanters largely black, femora and tibiae black in part, ferruginous beneath, tibiae yellow at base and apex, these two marks more or less connected by a narrow, yellow band, front femora yellow on lower margin, hind femora with a small yellow apical spot, all basitarsi yellow, the other tarsal segments becoming more reddish; abdominal terga with entire, narrow, transverse, subapical, yellow bands, the depressed margins narrowly black, bands abruptly broadened at each side, but quite narrow across the central expanse of each disc; tergum 6 largely yellow apically, black across base, the yellow area triangularly invaded with black on basal margin; face much longer than distance between eyes; eyes subparallel; lateral ocelli widely removed from margin of vertex, considerably nearer eyes than to each other; cheeks very slightly broader than eyes; mandibles 3-dentate; clypeus slightly convex, apical margin minutely denticulate; tegulae finely and quite closely punctate; wings faintly infuscated, veins piceous; all basitarsi rather slender and elongate; pubescence entirely pale, quite thin but rather elongate above except on the more

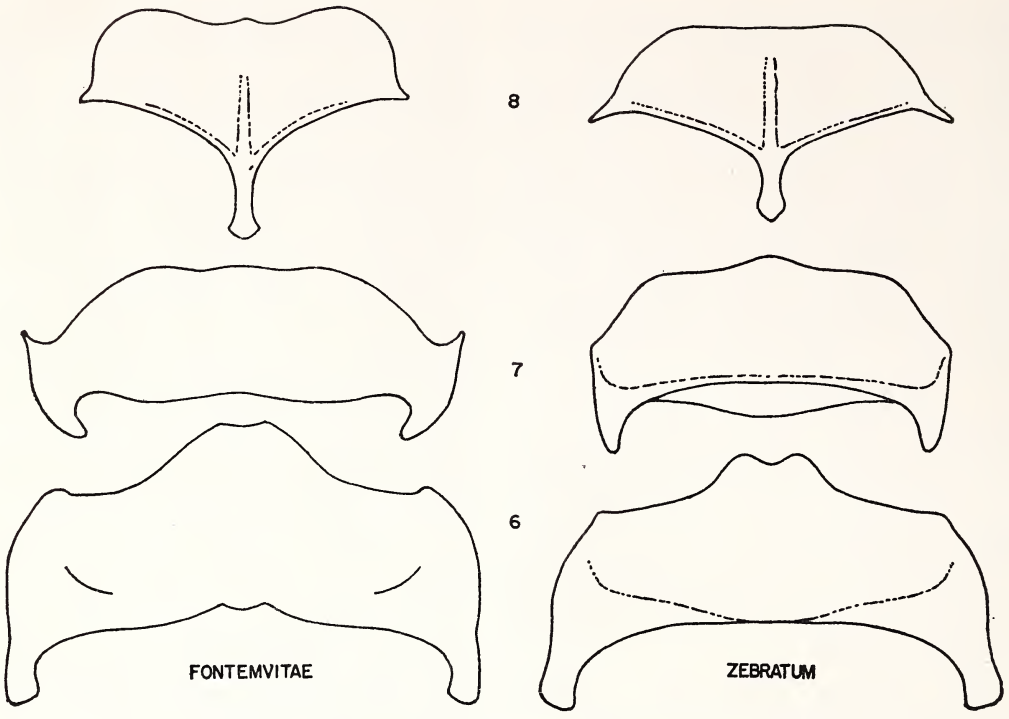


Figure 9—Sterna 6-8 in males of *Heteranthidium*.

apical abdominal terga, dense around antennae, on cheeks below and on pleura and venter of thorax, entirely whitish on legs and venter of abdomen; punctures quite deep and distinct, rather close in general, minute and rather sparse on cheeks posteriorly, but becoming quite close and coarse on vertex and on face below; punctures fine and quite close on pleura, the scutum and scutellum rather coarsely rugoso-punctate; punctures close on abdominal terga, rather coarse on basal tergum but rather fine and uniform on 2-5, 6 rather densely rugoso-punctate; tergum 7 rather coarsely rugoso-punctate, apical margin rather narrowly produced medially, this area obscurely tri-dentate; sterna 1-4 exposed, ferruginous, more or less pubescent, sternum 3 with a pair of short, dark, slender and distinct spines; sterna 5-8 retracted, form as shown (fig. 9); gonostyli of genital armature rather broadly dilated and angulate apically, as shown (fig. 10).

DISTRIBUTION—North Carolina to Florida, September and October.

FLOWER RECORDS—*Chrysopsis* and *Kuhnistera*.

Heteranthidium ridingsii (Cresson)

(Fig. 8)

Anthidium ridingsii Cresson, 1878. Amer. Ent. Soc. Trans. 7, proc. iii. ♀

Heteranthidium ridingsi Schwarz, 1926. Amer. Mus. Novitates 218, p. 5. ♂

FEMALE—Length 13 mm.; black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, widely removed from margin of vertex; clypeus nearly flat, apical margin nearly straight, with a very shallow, median, emarginate area and two or three minute denticles on each side; mandibles 4-dentate, teeth quite low; cheeks slightly narrower than eyes; tegulae black, strongly narrowed anteriorly, closely and deeply punctate; wings subhyaline basally, somewhat clouded apically, veins piceous; legs piceous, tibiae with dense, appressed, silvery pubescence on outer face, spurs pale yellow; pubescence entirely pale, very short and inconspicuous on upper part of face, dorsum of thorax and abdominal terga, rather dense around antennae, on cheeks below, and on pleura and propodeum; ventral scopa entirely white; punctures quite deep and distinct, close below ocelli and on clypeus, the latter

with an indefinite, narrow, median line which is less closely punctate; punctures well separated but not sparse on vertex and upper part of cheeks, becoming very close below; punctures rather coarse and slightly separated on shining scutum, becoming dense around margins, those on scutellum somewhat closer and more irregular; pleura closely punctate; abdominal terga shining, apical margins deeply and abruptly depressed, the rims narrowly ivory, discs distinctly and quite evenly punctured, punctures slightly separated but deep, distinct and rather coarse, those on tergum 6 fine and densely crowded, surface partially obscured by dense, appressed, pale tomentum.

MALE—Length 12 mm.; black, clypeus, mandibles, scape, tarsi and tibiae, in part yellow; length of face considerably greater than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, distance to posterior margin of vertex much greater; cheeks much narrower than eyes; clypeus only slightly convex, entirely yellow, margin with a pair of minute, submedian tubercles that demark a slight emargination; mandibles 3-dentate, teeth black in contrast with the yellow outer face; restricted lateral face marks and apical margin of supraclypeal area yellow, this not extending above antennae; scape yellow anteriorly, dark posteriorly, pedicel and flagellum black; tegulae black, much narrowed anteriorly, closely, finely and deeply punctate; wings subhyaline, becoming somewhat clouded apically, veins piceous; coxae, trochanters and femora black, tibiae more ferruginous, becoming somewhat yellowish toward apex on outer surface, tarsi entirely yellow, spurs yellowish; pubescence entirely pale, rather bright ochraceous on upper part of face, vertex, and on dorsum of thorax, elsewhere more whitish or cream-colored, quite thin above, dense around tubercles, around antennae, on lower cheeks, pleura and propodeum, and quite dense on front legs posteriorly and on outer faces of mid and hind tibiae; punctures deep and distinct, quite close in general, rather fine on head, only slightly separated on vertex laterally above each eye, elsewhere very close except on maculated areas, close and rather fine on pleura, much coarser on scutum where they are slightly separated over central area of disc, becoming quite dense around the margins, close and coarse on scutellum; abdominal terga shining, deeply and distinctly punctate, punctures quite close on tergum 1, well separated on 2-5, densely crowded and fine on 6, apical margins abruptly and deeply depressed, these narrowly margined with ivory bands that are continuous across the segments; tergum 6 slightly depressed in center, apical margin opposite this depression narrowly produced and subcarinate; tergum 7 quite broad, a narrow area on each side of apical margin produced, intervening space nearly straight, surface in large part bare and shining; sterna 1-5 largely exposed, rather densely whitish pubescent, apical margin of 3 with a median tuft of very short, dense, reddish-fuscous pubescence or tomentum; terga 6-8 retracted, form as shown (fig. 8); aedagus of genital armature sclerotized apically, tips of gonostyli abruptly dilated and club-shaped.

DISTRIBUTION—North Carolina to Florida and Texas, April to September.

FLOWER RECORDS—*Crotalaria, Galactia, Hypericum, Melilotus* and *Rhus*.

Heteranthidium zebratum (Cresson)

(Figs. 9 & 10)

Anthidium zebratum Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 270. ♂.

Protanthidium cockerelli Titus, 1902. Ent. News 13, p. 170. ♂.

Anthidium (Protanthidium) chippewaense Graenicher, 1910. Canad. Ent. 42, p. 157. ♂ ♀.

Heteranthidium zebratum Schwarz, 1926. Amer. Mus. Novitates 218, p. 11.

Heteranthidium zebratum mississippi Michener, 1937. Amer. Midland Nat. 38, p. 449. ♂ ♀.

FEMALE—Length 14 mm.; black, with yellow maculations; clypeus, lateral face marks extending narrowly nearly to top of eye, and a pair of small, elongate spots back of eyes, creamy-yellow; scutum entirely black or with a pair of small antero-lateral, yellow maculations, axillae with small yellow spots and scutellum with a pair of ovate, subapical maculations which are slightly separated medially; legs black except for a small, basal, yellow spot on tibiae; spurs testaceous; abdominal terga 1-5 with transverse, yellow bands which are subapical, broad laterally, strongly narrowed medially, apical margins of the terga slightly depressed, entirely black; face somewhat longer than distance between eyes; eyes subparallel; lateral ocelli nearer eyes than to margin of vertex, subequally distant from eyes and each other; cheeks considerably broader than eyes; mandibles entirely black, broad apically, with a slight median incision near center of a long cutting edge which is otherwise without teeth; clypeus slightly convex, apical margin with a shallow, vague, median emargination, edge minutely crenulate; tegulae very finely, closely and regularly punctate, with a small, anterior, yellow spot; wings lightly infuscated, veins piceous; pubes-

cence entirely pale, very short and thin, especially above, more dense but still rather short on cheeks, pleura and propodeum; ventral scopa entirely pale ochraceous, sternum 6 with very short pubescence; punctures fine and close in general, but rather deep and distinct, rather well separated but still close at lower margin of supraclypeal area and over clypeus and lateral areas of face, very close across vertex and down the cheeks, fine and dense over entire thorax, the scutum and scutellum being finely rugoso-punctate; punctures close and rather fine on abdominal terga, becoming extremely fine on tergum 5, tergum 6 densely and finely rugoso-punctate, with an apical, ventral lip medially, a deep depression between this and the disc.

MALE—Length 14 mm.; black, with yellow maculations; clypeus, mandibles except teeth, lateral facial maculae extending narrowly nearly to top of eye, and margin of supraclypeal area, narrowly yellow; an elongate yellow mark back of upper half of eye and a pair of very small maculations on cheeks below, adjacent to mandible; thorax without maculations and legs black, but each tibia with a small, basal, and a pair of apical, yellow spots, basitarsi yellow on outer face, remaining tarsal segments brownish; spurs testaceous; abdominal terga 1-5 with entire, transverse, yellow bands, these broad laterally, strongly narrowed medially but not interrupted, the apical depressed margins entirely black; tergum 6 largely yellow, black only narrowly across base, this slightly invading the midline; sternum 7 entirely black; face considerably longer than distance between eyes; eyes subparallel; lateral ocelli much nearer eyes than to margin of vertex and slightly nearer eyes than to each other; cheeks slightly broader than eyes; mandibles without a distinct, median tooth between the apical and inner teeth; clypeus slightly convex, apical margin very nearly straight, with about five minute dentacles; tegulae entirely black, closely and finely punctate; wings lightly infuscated, veins piceous; pubescence entirely pale, rather pale ochraceous on upper part of head and dorsum of thorax, becoming whitish on thorax beneath and on cheeks below; punctures fine and very close in general, close below ocelli and between antennae, more distinctly separated on clypeus, lateral maculated areas of face, and on vertex, becoming rather sparse on the shining cheeks posteriorly; punctures very fine and close on pleura, the scutum and scutellum dull and densely rugoso-punctate, pubescence rather dense and elongate; abdominal terga closely and rather uniformly punctate, but punctures rather coarse on 1 and 2, becoming finer on the more apical segments, rather densely crowded on 6, apical margin of 6 slightly out-curved over median third, 7 short and broad, somewhat shining, with a distinct but low, median angle, lateral angles narrowly rounded, fringed with short, pale pubescence; sterna 1-4 quite fully exposed, 3 and 4 with rather copious, pale ochraceous pubescence, 5 somewhat excavated medially, becoming densely pubescent on each extreme side, 6-8 retracted, form as shown (fig. 9); gonostyli of genital armature broadly expanded and angulate apically, otherwise as shown (fig. 10).

DISTRIBUTION — Primarily western, but reaching Michigan and Mississippi in one or another of its forms, August to October.

FLOWER RECORDS—*Gaillardia* and *Helianthus*.

Although this species is primarily western in distribution, scattered records indicate that the range reaches across the Mississippi from Wisconsin and Michigan to the Gulf of Mexico, in Mississippi. It is quite variable with respect to the degree of maculation, and two subspecies have been proposed for the forms that occur in the East. In both of these the extent of maculation is reduced over that observed in the western material. There is so much variability in any extensive series collected in any given locality, as shown by the descriptions of Swenk, Schwarz and Michener, that the desirability of recognizing subspecies is questionable. It seems evident that in the West a higher percentage of any population shows extensive maculation than a similar sample of specimens taken in the East; but from the descriptions it would seem evident that almost all extremes could be expected from any given area. The following brief summary indicates the differences so far as they can be ascertained:

H. zebratum zebratum—MALE—Scutellum maculated;transverse band on basal abdominal tergum complete and tergal bands not emarginate anteriorly toward the sides. FEMALE—Scutellum 4-spotted; clypeus and lateral face marks whitish; maculations on cheeks more extensive.

H. zebratum chippewaense—MALE—Scutellum entirely black; transverse band on basal tergum interrupted medially; tergal bands emarginate on each side anteriorly; tergum 6 largely yellow; tubercles maculated and tibiae with two apical yellow spots.

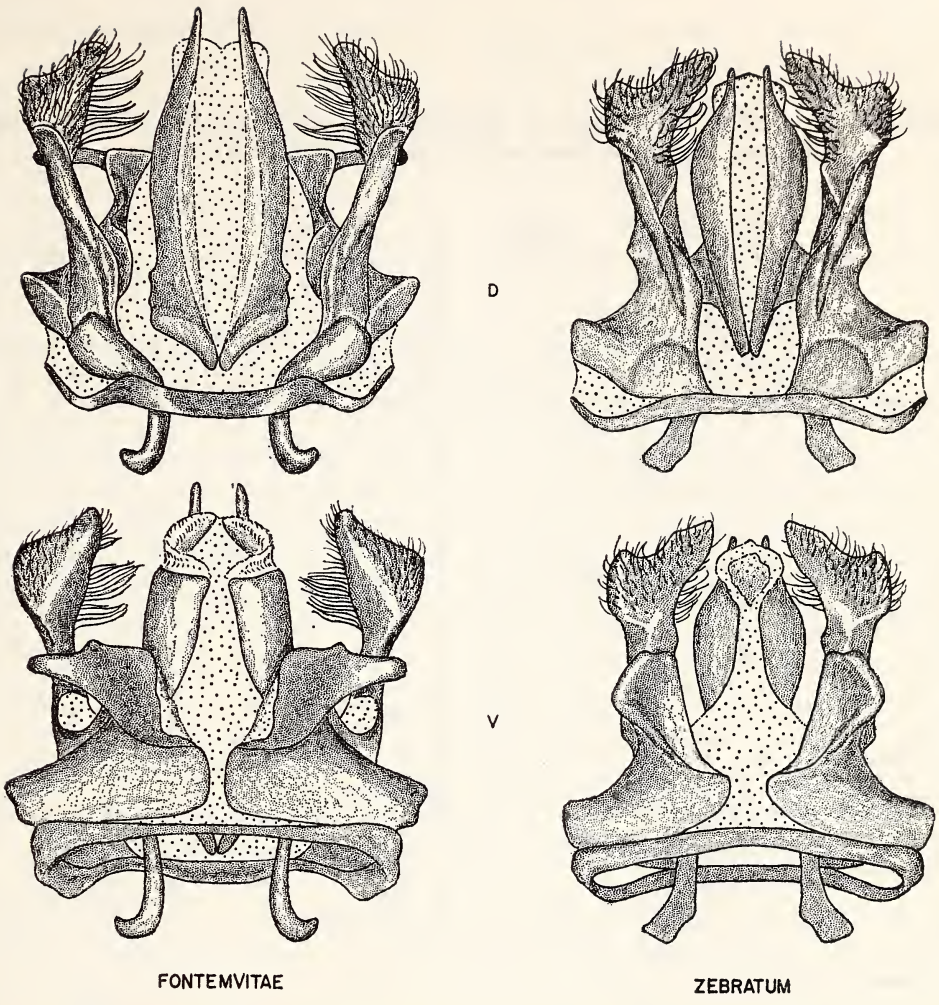


Figure 10—Dorsal and ventral views of genital armature in males of *Heteranthidium*.

FEMALE—Scutellum 2-spotted; facial maculae yellow; maculation of cheeks reduced.

H. zebratum mississippi—MALE—Tubercles entirely black; tibiae often with only one apical yellow spot; tergum 6 largely black. FEMALE—Yellow line back of eye absent or very small; scutum entirely black or with a small spot on each side adjacent to tegulae; scutellum black or with two yellow spots; axillae spotted or not.

In the material at hand there is a paratype pair of *mississippi*, a male from Minnesota which seems to fit the description of *chippewaense*, and a male from Michigan which agrees better with *zebratum* s. str. than with either of the other two forms.

Table 1—Distribution of species of *Lithurgus, Anthidium, Dianthidium, Paranthidium, Anthidiellum* and *Heteranthidium* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Lithurgus	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
bruesi									X																		
gibbosus																						X				X	X
Anthidium																											
maculifrons									X										X		X	X		X		X	X
psoraleae								X	X																		
Dianthidium																											
curvatum																						X	X		X	X	X
floridiense																											X
simile	X						X	X						X								X				X	
Paranthidium																											
jugatorium							X			X			X	X								X				X	
j. lepidum												X							X		X	X				X	
Anthidiellum																											
notatum				X		X			X					X								X	X	X		X	X
n. boreale									X																		
n. rufimaculatum																											X
perplexum																						X	X			X	X
Heteranthidium																											
crassipes																						X				X	X
dorsale														X								X			X	X	
fontemvitae																						X	X			X	X
ridingsi																						X	X	X	X	X	X
zebratum							X	X																X			

Heterostelis Timberlake

Stelis subg. *Heterostelis* Timberlake, 1941. N. Y. Ent. Soc. Jour. 49, p. 125. Type: *Stelis anthidioides* Timberlake. Orig. desig.

Species of *Heterostelis* are large, handsome bees with conspicuous yellow or red maculations on the head, thorax and abdomen. Being parasitic, the females lack the brush of scopal hairs beneath the abdomen. The scutellum is produced slightly over the posterior face of the propodeum which is entirely vertical, and lacks any development of a dorsal pitted area. The mesopleura are divided into anterior and lateral surfaces which are separated by a sharp carina. The mandibles in the female are broad and but feebly dentate. The second recurrent vein terminates beyond the tip of the second submarginal cell.

The males resemble the females closely in size, coloration and general structure. The genital armature closely resembles that in species of *Stelis*. It is very small, relative to the width of the abdomen, being less than half as broad as the fourth sternal plate (see fig. 11). Sternum 4 has a conspicuous apical fringe of elongate hairs that is interrupted medially by a rather narrow, apical comb of short, stout, black setae.

It seems probable that the hosts of these inquilines are other anthidiine bees, possibly *Heteranthidium*.

KEY TO SPECIES

Females

1. Larger (13 mm.); mandibles more elongate, 2nd tooth being midway between apex and inner angle; tergum 6 obtusely angulate on each side .... *grossa* new species (p. 35)
   Smaller (10 mm.); mandibles shorter, 2nd tooth much nearer apex than to inner angle; tergum 6 regularly rounded 2
2. Abdominal terga 1 and 2 broadly ferruginous medially, between the yellow lateral maculations .... *australis floridensis* new subspecies
   Terga 1 and 2 black medially .... *australis australis* Cresson

Heterostelis australis australis (Cresson)

Stelis australis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 92. ♀.

FEMALE—Length 10 mm.; black, with yellow maculations; head black except for the yellow, lateral, facial maculae which extend narrowly to top of eye; mandibles ferruginous in large part, and scape brownish, with a more testaceous base and apex, flagellum rather dark brown; tubercles, axillae, a small spot on metapleura beneath hind wing, triangular maculations on scutellum laterally, and lateral and anterior margin of scutum yellow, but median portion of margin of scutellum, black; abdominal terga 1-5 with large, transverse, lateral, yellow maculae, these widely separated on the more basal terga, becoming somewhat more approximate on tergum 5; face slightly longer than distance between eyes above; eyes slightly convergent below; ocelli very small, diameter about that of some of the coarse punctures of vertex, lateral pair slightly nearer each other than to margin of vertex, more distant from eyes; clypeus very slightly convex, apical margin nearly straight, with a dense fringe; mandibles 3-dentate, teeth black, middle tooth nearer the apical than to inner angle; cheeks somewhat narrower than eyes; wings rather deeply and quite uniformly infuscated, veins brownish-testaceous; tegulae brownish-testaceous, quite deeply, closely and rather coarsely punctate; legs reddish-piceous at base, the femora more or less yellowish at apex, tibiae and tarsi yellowish, with reddish infusions; spurs yellowish; pubescence very short and thin, entirely pale, somewhat more copious around antennae and below wing bases; 2nd recurrent vein ending beyond apex of 2nd submarginal cell; punctures deep and distinct, quite coarse, rather close over most of the body but sparse across vertex, very fine and rather sparse between ocelli; punctures close over lower portions of head and over most of thorax, coarser on scutellum and pleura; punctures rather distinctly separated but not sparse on abdominal terga medially, becoming rather fine toward apical margins, these narrowly impunctate and shining, entirely black; tergum 6 rounded, apical margin on each side finely denticulate, but this obscured by the short and rather dense pubescence; abdominal sterna shining, apical margins narrowly yellowish-hyaline, discs rather coarsely punctate at least laterally, but these becoming very fine toward midline on the more basal segments.

DISTRIBUTION—New Jersey to Georgia, in August.

FLOWER RECORD—*Helenium*.

Heterostelis australis floridensis new subspecies

(Fig. 11)

FEMALE—Length 10 mm.; black, with yel-

low and ferruginous maculations; mandibles except teeth, clypeus laterally, scape, a narrow line across vertex, upper portion of pleura, metapleura in large part, basal portions of legs, posterior face of propodeum above, and median areas of abdominal terga 1 and 2, ferruginous; lateral facial maculae extending broadly to top of eye where they terminate abruptly, tubercles, axillae, lateral portions of scutellum, lateral marks of scutum produced along anterior margin, and large, transverse, lateral maculations on abdominal terga 1-5, bright yellow; tegulae ferruginous; apical portions of legs brownish-testaceous; general structure, puncturation and pubescence as in *australis* s. str.

MALE—Length 9 mm.; black, with yellow and ferruginous maculations; mandibles, scape, pronotum in large part, tegulae, a spot on metapleura below wing base, and median portion of basal segment of abdomen, ferruginous; lateral face marks ending abruptly near top of eye, tubercles, axillae, lateral triangular marks on scutellum, lateral margins of scutum extending up onto anterior margin, and lateral transverse maculations on abdominal terga 1-5, bright yellow; face slightly longer than distance between eyes above; eyes somewhat convergent below; ocelli very small, not much larger than the more coarse punctures, subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus quite flat, apical margin straight, with a quite dense and elongate apical fringe; mandibles 3-dentate, teeth black, median tooth much nearer apical tooth than to inner angle; cheeks much narrower than eyes; wings pale fuliginous, slightly darker along outer margin and in marginal cell, veins brownish-testaceous; tegulae closely, deeply and distinctly punctate; legs yellowish-testaceous in large part; spurs testaceous; pubescence very short and thin, entirely pale, hardly evident dorsally, becoming somewhat more copious around antenae, on pleura below wing bases, and on tibiae and tarsi; punctures deep and distinct, rather coarse, close in general on head and thorax, but quite sparse across vertex, very fine and rather sparse between ocelli, quite coarse on pleura and scutellum; punctures distinctly separated but not sparse on abdominal terga medially, becoming somewhat finer toward the shining, narrow, impunctate, apical margins which are entirely dark; tergum 6 quite short, minutely denticulate on each side, slightly protuberant medially, this protuberance with a slight emargination; tergum 7 much smaller, but much broader than long, with a median, compressed, carinate projection; abdominal sterna 1-3 exposed, ferruginous, with rather close punctures and fine, pale pubescence; sterna 4-8 retracted, 4 with a median, apical comb which is piceous in color in contrast with the other portions of the plate, apical margin on each side with an elongate fringe, other sternal plates as shown (fig. 11); genital armature very small, relative to breadth of abdomen, the gonostyli angulate and abruptly dilated, as shown.

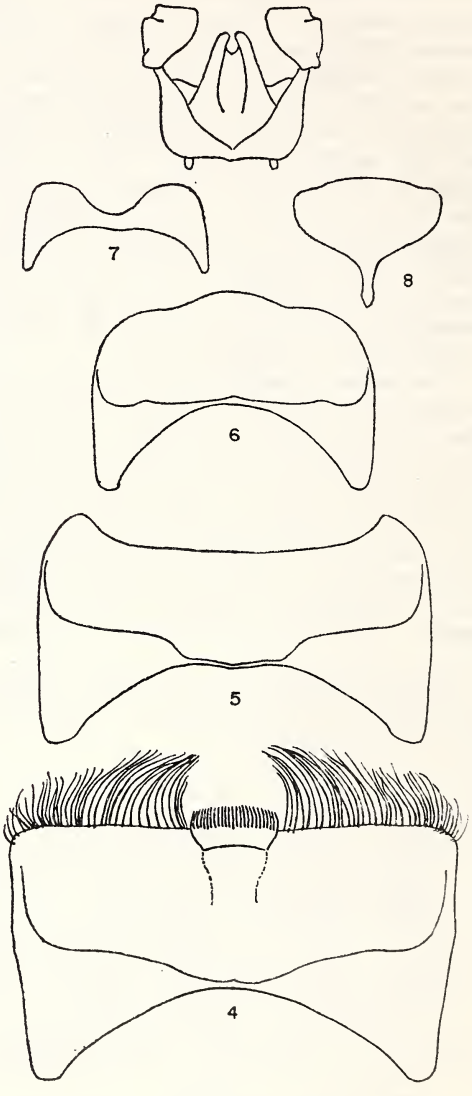


Figure 11
Genital armature and sterna 4-8 in males of *Heterostelis australis floridensis.*

TYPES—Holotype: Female, Levy Co., Fla., July 13, 1954 (H. V. Weems, Jr., on *Eriogonum tomentosum*). Allotype: Topotypical. Paratypes: 1♂, topotypical; 2♀♀, Gainesville, Alachua Co., Fla., Aug. 26 and 27, 1953, (Weems, on *Rhus copallinum*) [all Fla. State Plant Board].

Heterostelis grossa new species

FEMALE—Length 13 mm.; black, with yellow maculations; lateral facial maculations ending broadly and abruptly near top of eye, adjacent margin of clypeus, a small transverse spot at each extreme side of vertex, tubercles, axillae, small subtriangular lateral spots on scutellum, lateral margin of scutum extending rather broadly onto anterior margin, and broad, lateral, transverse maculations on abdominal terga 1-5 which are rather widely separated medially, yellow; face somewhat longer than distance between eyes above; eyes slightly convergent below; ocelli very small, not much larger than the more coarse punctures, lateral pair subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus very slightly convex, apical margin about straight, with a dense apical fringe of elongate yellowish hairs; mandibles largely ferruginous, teeth more piceous, 3-dentate, middle tooth subequally distant from apical and inner teeth; cheeks somewhat narrower than eyes; tegulae testaceous, coarsely, deeply and closely punctate; wings quite uniformly infuscated, veins more piceous; 2nd recurrent vein terminating beyond tip of 2nd submarginal cell; coxae and trochanters piceous in general, femora more reddish-testaceous, tibiae and tarsi becoming yellowish; spurs testaceous; pubescence very short and thin, entirely pale, hardly evident dorsally, with very short but rather dense tufts beneath posterior wing bases; punctures in general coarse, deep and distinct, rather sparse across vertex and on lateral portions of upper part of face, becoming close just below and around ocelli, clypeus with a rather indefinite, median line, punctures close on each side; punctures coarse, close, deep and quite uniform over scutum, somewhat coarser but close on scutellum, coarse and distinct but quite close on pleura; puncturation of abdomen much finer, rather coarse on basal tergum medially, but becoming fine toward apical margin and fine on terga 2-4 medially where they are well separated, becoming coarser and quite close laterally and on tergum 5, apical margins narrowly impunctate and somewhat shining, entirely dark; tergum 6 coarsely rugoso-punctate, apical margin obtusely angulate on each side, the margin finely crenulate, median area slightly produced; abdominal sterna smooth and shining, the more basal segments ferruginous, with fine, well separated and irregular punctures, these becoming more coarse, deep, distinct and close on the more apical segments, sternum 6 almost rugose, apical margins of these sternal plates narrowly yellowish-hyaline.

TYPES—Holotype: Female, Gainesville, Fla., Oct. 19, 1918 (P. W. Fattig) [Cornell Univ.].

Stelis Panzer

Stelis Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, 2, p. 246.
Type: (*Apis aterrima* Panzer) = *Apis punctulatissima* Kirby. Monob.

Gyrodroma Klug, 1807. Mag. Insektenk. 6, p. 198. Type: (*Apis aterrima* Panzer) = *Apis punctulatissima* Kirby. Monob.

Gymnus Spinola, 1808 Insectorum Liguriae, 2, p. 9. Type: (*Apis aterrima* Panzer) = *Apis punctulatissima* Kirby. Monob.

Ceraplastes Gistel, 1848. Naturgesch. Thierr. f. höh. Schul., p.x. Proposed unnecessarily to replace *Stelis*.

Chelynia Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 322. Type: *Chelynia labiata* Provancher. Monob.

Stelis subg. *Protostelis* Friese, 1895. Die Bienen Europas 1, p. 25. Type: *Stelis freygessneri* Friese. Desig. by Popov, 1938.

Stelis Cockerell, 1898. Entomologist 31, p. 166. (key)

Melanostelis Ashmead, 1898. Psyche 8, p. 283. Type: (*Melanostelis betheli* Ashmead) = *Chelynia rubi* Cockerell. Monob. and orig. desig.

Stelidium Robertson, 1902. Canad. Ent. 24, p. 323. Type: *Stelidium trypetinum* Robertson. Monob. and orig. desig.

Microstelis Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 170. Type: *Stelis lateralis* Cresson. Orig. desig.

Stelis subg. *Pavostelis* Sladen, 1916. Canad. Ent. 48, p. 313. Type: *Stelis montana* Cresson. Monob.

Stelis subg. *Stelidina* Timberlake, 1941. N. Y. Ent. Soc. Jour. 49, p. 131. Type: *Stelis hemirhoda* Linsley. Orig. desig.

Stelis is a genus of parasitic bees characterized usually by the presence of yellow, ivory or reddish maculations. The scopa is lacking in the females. As in the non-parasitic anthidiine bees, the stigma of the front wing is very short. The scutellum is rounded; the posterior face of the propodeum is vertical, but there is a narrow, coarsely pitted area along the upper margin that inclines to the horizontal; the mandibles are 3-dentate in both sexes; the mid basitarsi are shorter than their tibiae; and the gonostyli of the male genital armature are abruptly dilated apically, the resulting club strongly angulate. Typical *Stelis* is an Old World group of species characterized by acutely pointed axillae. In all of the Nearctic species the axillae are rounded.

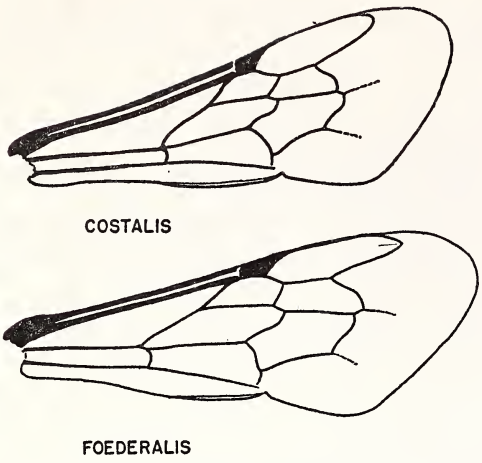


Figure 12
Venation of front wing in *Stelis costalis* and *S. foederalis*.

The subgenus *Chelynia* has been elevated to generic rank in the Catalog of Hymenoptera (p. 1148) but is being reduced here to subgeneric rank. It is based on *Chelynia labiata* Provancher, and has been separated from *Stelis* by the supposed difference in the relation of the second recurrent vein to the second submarginal cell. In certain of the subgenera *(Protostelis, Microstelis* and *Pavostelis)* the second recurrent vein terminates very close to the second transverse cubitus, or somewhat beyond it, while in *Chelynia* it has been thought that both recurrent veins terminated well within the limits of the second submarginal cell. This is true of *S. (Stelidium) trypetina* Robertson, and in *S. foederalis* Smith and *S. nitida* Cresson. However, in *labiata* Provancher, the genotype of *Chelynia,* this character is lacking in constancy, and in the type specimen, at the Provincial Museum of Quebec, the second recurrent vein is practically contiguous with the second transverse cubitus. It more nearly resembles *Microstelis* than it does the other species that have been placed in *Chelynia.* Moreover, in the males the telescoped abdominal sterna of *labiata* (fig. 13) are nearly identical with those of *Microstelis lateralis.* It seems probable that *Microstelis* should be considered a synonym of *Chelynia,* while *nitida* and its allies should constitute a new subgeneric group. A revisional study of the New World species is needed, and the assignment of a name for the group is avoided here in the belief that it is better that a future reviser draw his own conclusions and propose an appropriate name if it is needed.

Species of *Stelis* are inquilines in the nests of *Osmia, Hoplitis, Heriades, Anthidium* and allies and possibly *Ceratina.*

KEY TO SPECIES

Females

1. Sternum 6 with a robust, median, terminal spine 2
   Sternum 6 not spinose 4
2. First recurrent vein nearly interstitial with 1st transverse cubital vein; basal abdominal tergum with a pair of widely separated lateral yellow spots, without a transverse band ..... *michiganensis* new species (p. 45)
   First recurrent vein well removed from 1st transverse cubital; basal tergum with a transverse yellow band 3
3. Scutum closely punctate, interspaces not exceeding diameter of punctures; abdominal bands narrow, separated from rims of terga by wider black areas ..... *foederalis* (Smith) (p. 45)
   Scutum more sparsely punctate; abdominal bands broader, slightly exceeding width of apical black area ..... *nitida* (Cresson) (p. 46)

4(1). Thorax conspicuously maculated; carina of prothoracic tubercles elongated, extended toward midline (*Protostelis*) .. 5
   Thorax entirely black; pronotal tubercles not produced 6

5. Abdominal tergum 2 maculated medially .. *costalis floridana* Graenicher (p. 38)
   Tergum 2 with conspicuous, lateral maculations which are widely separated, otherwise black ..... *costalis costalis* Cresson (p. 37)

6(4). Sternum 6 broadly rounded, projecting much beyond tip of tergum 6; head with small but distinct maculations above each eye and along inner orbits ..... (*Stelidium*) *trypetina* Robertson (p. 44)
   Sternum 6 projecting but very slightly beyond the tergum, if at all, head without maculations 7

7. Entirely black, lacking maculations even on abdomen (*Pavostelis*) 8
   Abdomen to some degree maculated 9

8. Large (10 mm.); scutum more closely punctate, interspaces not equalling diameter of punctures ..... *ater* new species (p. 39)

Smaller (8 mm.); scutum more sparsely punctate, interspaces exceeding diameter of punctures on posterior half of disc .. .. *diversicolor* Crawford (p. 39)

9(7). Tergum 6 rather short, breadth nearly twice the median length, its apical margin broadly triangular 10
Tergum 6 quite broadly rounded 11

10. Abdominal terga with transverse, submedian, yellowish bands, interrupted medially, and sometimes with more lateral interruptions as well; antennal segments more elongate .... *labiata* Provancher (p. 40)
Abdominal terga 1-3 with widely separated, lateral, yellowish spots, terga 4 and 5 often with 2 or 4 more median spots ..... *lateralis* Cresson (p. 42)

11(9). Tergum 6 more nearly vertical, with a deep, subapical groove; sternum 6 coarsely and deeply punctate .... *vernalis* new species (p. 43)
Tergum 6 more nearly horizontal, not at all grooved; sternum 6 with minute, densely crowded punctures .... *subemarginata* Cresson (p. 47)

Males

1. Thorax conspicuously maculated; carina of prothoracic tubercles produced mesally (*Protostelis*) 2
Thorax entirely black; tubercles not produced 3

2. Abdominal tergum 2 ferruginous medially; legs ferruginous in large part; .... .. *costalis floridana* Graenicher (p. 38)
Tergum 2 with conspicuous, lateral maculations which are widely separated, otherwise black; legs black or piceous at base, becoming testaceous apically .. .. *costalis costalis* Cresson (p. 37)

3(1). Face with small, ivory maculations along inner orbits .... (*Stelidium*) *trypetina* Robertson (p. 44)
Face not maculated 4

4. Abdomen entirely black, without maculations; sternum 5 with a median, apical comb .... *(Pavostelis) diversicolor* Crawford (p. 39)
Abdomen to some degree maculated, sternum 4 with a median, apical comb ..5

5. Both recurrent veins interstitial with transverse cubital veins; tegulae and legs ferruginous .... *plenum* Provancher (p. 43)
Legs and tegulae black; no more than one recurrent vein interstitial with its corresponding transverse cubital 6

6. Both recurrent veins received well within base and apex of 2nd submarginal cell; terga 4 and 5 with uninterrupted, transverse bands 7
Second recurrent vein interstitial or nearly with 2nd transverse cubital 8

7. Larger (8 mm.); abdominal bands broader, covering fully half of each disc at extreme sides; tergum 6 distinctly maculated; sternum 3 nearly impunctate over median area of plate .... ? *nitida* Cresson (p. 46)
Smaller (6-7 mm.); abdominal bands narrower, covering less than half of disc at extreme sides; tergum 6 not distinctly maculated; sternum 3 fully punctate .. .. *foederalis* Smith (p. 45)

8(6) Terga 1-4 with narrow, transverse, median, yellowish bands .... *labiata* Provancher (p. 40)
Terga 1-4 with widely separated, lateral, yellowish or whitish spots 9

9. Median third of sternum 3 thickened apically, this area with a fringe of short hairs, lateral areas not fringed .... *vernalis* new species (p. 43)
Margin of sternum 3 not much thicker medially than toward sides, with a more extensive fringe of more elongate hairs ..... *lateralis* Cresson (p. 42)

Stelis (Protostelis) costalis costalis Cresson

(Figs. 12 & 13)

Stelis costalis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 274. ♀ ♂.

Stelis louisae Cockerell, 1911. U. S. Natl. Mus. Proc. 40, p. 247. ♂. New synonymy.

FEMALE—Length 8 mm.; black, with yellow maculations on head, thorax and abdomen; face with lateral yellow maculae along inner orbits from clypeus nearly to top of eye, with some intrusion on each side of clypeus, and vertex with a pair of transverse, yellow maculae along posterior margin; scutum narrowly yellow on each lateral margin, this extending more broadly along anterior margin, median portion black; axillae yellow, and posterior border of scutellum broadly yellow, median area black; mesopleura with a large, yellow blotch above, metapleura with a small yellow spot; abdominal tergum 1 with a continuous, broad, transverse, yellow band, this somewhat ferruginous on anterior and posterior borders, tergum 2 with widely separated, lateral, yellow spots, 3 and 4 with transverse bands, these more or less interrupted on each side anteriorly, 5 with a rather short, transverse, yellow band medially, 6 entirely black; face somewhat

longer than distance between eyes above; eyes slightly convergent below; lateral ocelli large, somewhat nearer eyes than to each other; clypeus rather flat, apical margin nearly straight; labrum with a low, basal protuberance; mandibles entirely black, 3-dentate, median tooth slightly nearer apex than to inner angle; cheeks very slightly narrower than eyes; tegulae brownish-testaceous, becoming more yellowish anteriorly; wings subhyaline, becoming lightly infuscated in region of marginal and submarginal cells, veins brownish; legs piceous to black basally, femora becoming testaceous apically, tibiae testaceous, each with a narrow yellow stripe on outer face near base, tarsi and spurs entirely testaceous; front and mid tibiae terminating apically with a distinct, rather slender, anterior spine which is quite elongate, and a shorter, posterior spine, hind tibiae with but a single anterior spine; pubescence uniformly very short, thin, entirely pale, hardly visible above, somewhat more dense near upper margin of lateral faces of propodeum; carina of prothoracic tubercles elongated, extending along anterior margin of scutum; punctures uniformly very coarse and deep, close in large part, but distinctly although not widely separated on scutum and scutellum, somewhat more widely separated on the more basal abdominal terga where they are not quite so coarse, becoming very close on tergum 6 which is coarsely rugose posteriorly; abdominal sterna smooth and shining, punctures somewhat finer and quite sparse, but sternum 6 deeply, closely and quite uniformly punctate.

MALE—Length 8 mm.; black, with yellow maculations on head, thorax and abdomen; clypeus yellow in large part, apical margin black; lateral, yellow, facial maculae broad, extending from clypeus to top of eye, ending abruptly above, and vertex with a transverse, yellow maculation along posterior border; scutum narrowly yellow laterally, this extending broadly onto anterior margin, the median portion of which is black; axillae entirely yellow and scutellum broadly yellow posteriorly, median area black; mesopleura with a large, yellow blotch above, and metapleura with a smaller yellow spot; legs black basally, femora becoming testaceous apically, tibiae yellow toward base and on outer margin, becoming more testaceous apically, tarsi entirely testaceous, spurs pale yellow; basal abdominal tergum with a broad, continuous, transverse, yellow band, tergum 2 with widely separated, lateral, yellow spots, 3 and 4 with rather narrow, transverse, yellow bands which are strongly narrowed toward sides and connected with somewhat larger lateral spots, 5 with a rather short, median, transverse, subapical spot, 6 and 7 entirely black; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli quite large, nearer margin of vertex than to eyes; clypeus broadly convex, apical margin straight; labrum very slightly protuberant at base; mandibles entirely black, 3-dentate, median tooth very low, located nearer apical tooth than to inner angle; cheeks much narrower than eyes; carina of prothoracic tubercles extended along anterior margin of scutum; tegulae quite expansive, somewhat brownish-testaceous, becoming yellowish anteriorly and laterally; wings subhyaline basally, becoming rather strongly infuscated in region of marginal and submarginal cells, veins more piceous; tibiae spinose at tip, front and mid pair with a more elongate, anterior spine and a short, posterior spine, hind tibiae lacking the posterior spine; pubescence uniformly very short, thin and inconspicuous, entirely pale; punctures very coarse, deep and distinct, rather close in general, more distinctly separated between ocelli and antennae, on scutum posteriorly, and on scutellum, rather fine on clypeus, those on the abdominal terga somewhat more widely separated medially, becoming close laterally, and very close on the more apical plates; basal abdominal sternum somewhat elevated medially, sternum 2 quite expansive, broadly rounded, margin elevated, covering sternum 3 in large part, apical margin of 3 broadly membranous and deeply incised medially; sterna 4 and 8 retracted, apical margin of 4 with a pair of robust, erect spines medially, a fringe of elongate hairs on each side, form of the remaining plates as shown (fig. 13); gonostyli broadly and angulately dilated apically, as shown.

DISTRIBUTION—Kentucky and Virginia, south to Texas and Florida, March to September.

FLOWER RECORDS—*Bidens, Ceanothus, Erigeron, Helianthus, Ilex, Melilotus, Polygonum, Psoralea, Pycnanthemum, Rhus, Senecio, Silphium* and *Solidago*.

Stelis (Protostelis) costalis floridana Graenicher new combination

Stelis floridana Graenicher, 1928. Ent. News 39, p. 282. ♀ ♂.

This form differs from typical *costalis* in the somewhat larger size, being 8-9 mm. in length, and by the more extensive maculated areas which are in large part ferruginous rather than yellow; also the legs are entirely ferruginous or testaceous. In both sexes the clypeus is in large part maculated, the lateral facial maculations much

broader and more extensive and the posterior band on the vertex extends across the head and down to some degree behind the eyes. The maculations of the pleura and scutum are much as in typical *costalis* but are somewhat more extensive, the scutellum being almost entirely ferruginous. On the abdomen the basal tergum is almost entirely ferruginous and on tergum 2 the lateral marks are more or less broadly connected across the median part of the disc, while the maculations on 3-5 are not greatly different from the typical form.

DISTRIBUTION—Florida, March to July.

FLOWER RECORDS—*Bidens* and *Melilotus*.

Stelis (Pavostelis) ater new species

FEMALE—Length 10 mm.; entirely black, without maculations; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus evenly convex, apical margin very slightly incurved on each extreme side; mandibles 3-dentate, middle tooth somewhat nearer apical tooth than to inner angle; cheeks considerably broader than eyes; transverse carina of prothoracic tubercles barely evident; tegulae smooth and shining, minutely and quite sparsely punctate; wings quite deeply infuscated, veins piceous; apical spines of front tibiae reduced to acute angles, those of mid tibiae well developed, hind tibiae with a pair of apical, triangular carinae but without distinct spines; spurs of front legs testaceous-hyaline, those on mid and hind tibiae blackish; pubescence entirely pale, very short and thin, somewhat more dense on each side of face and on pleura; abdominal terga 1-3 with thin, whitish and inconspicuous, apical fasciae, tergum 4 subfasciate toward sides; punctures quite deep and distinct, rather coarse, close in general, very fine and crowded over clypeus and lower portions of face, becoming somewhat coarser and more distinct on vertex and cheeks, coarse and close on pleura and scutellum, somewhat finer on scutum, distinctly but not widely separated over median portion of disc; posterior face of propodeum with a narrow, dorsal, deeply pitted area just beneath metanotum; punctures of abdominal terga deep and distinct, slightly separated on terga 1-3 medially, becoming slightly coarser and closer laterally, very close on 4, coarse and close on 5 and 6, apical margin of 6 forming a rather distinct, apical lip; abdominal sterna coarsely and rather closely punctate toward apical margin, the margins very narrowly testaceous-hyaline, sternum 5 quite coarsely and very closely punctate over entire disc, and 6 finely and closely punctate, apical margin angulate.

TYPES—Holotype: Female, 2 miles west of Archer, Florida, March 23, 1953 (H. F. Howden) [authors coll.]. Paratypes: 1♀, Cork Screw Swamp, Collier Co., Fla., April 9, 1958 (H. V. Weems, Jr., on *Cirsium*) [Florida Plant Board]; 1♀ Sarasota, Florida, January 1937 (F. Pelton) [U.S.N.M.].

Stelis (Pavostelis) diversicolor Crawford

(Fig. 14)

Stelis diversicolor Crawford, 1916. Insecutor Inscitiae Menstruus 4, p. 106. ♂.

FEMALE—Length 8 mm.; entirely black, with no maculations, even on abdomen; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli considerably nearer margin of vertex than to each other, subequally distant from eyes and each other; clypeus nearly flat, apical margin quite straight; mandibles 3-dentate, middle tooth about mid way between apical and inner teeth; cheeks considerably broader than eyes; carina of prothoracic tubercle barely evident; tegulae rather small, shining, sparsely and minutely punctate; wings lightly infuscated, veins piceous to brownish-testaceous, 2nd recurrent vein terminating beyond tip of 2nd submarginal cell; apical spines of front tibiae reduced to minute angles, the mid tibiae with distinct, acute, apical spines, hind tibiae with a short, more anterior spine and a posterior rounded carina; anterior spurs more testaceous, mid and hind spurs blackish; pubescence entirely pale, short and rather thin, but quite copious on sides of face, on lower cheeks, on thorax laterally, and on basal portions of legs; abdominal terga 1-4 with thin but evident, apical, whitish fasciae; punctures deep and distinct, quite coarse and close in large part, finer on sides of face and on clypeus apically, very close just above eyes but becoming more distinct on cheeks below and on vertex, coarse on pleura, becoming rather sparse below, well separated over posterior half of scutum, and very coarse and slightly separated on scutellum; propodeum with a very narrow, dorsal, pitted area; punctures of abdominal terga quite coarse, deep and distinct, rather well separated on median portions of terga 1-3, becoming closer and somewhat coarser laterally and on the more

apical terga, 5 and 6 being rather coarsely rugoso-punctate laterally and across apical margin of 6; tergum 6 broadly rounded, apical margin very slightly produced and flange-like; abdominal sterna 2-4 rather coarsely and sparsely punctate across median areas of disc, 4 rather broadly incurved apically, 5 and 6 closely, deeply and distinctly punctate, 6 obtusely pointed medially.

MALE—Length 7 mm.; entirely black, with no maculations; head considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli nearer margin of vertex than to each other, subequally distant from eyes and each other; clypeus rather strongly convex, apical margin nearly straight; mandibles 3-dentate, middle tooth subequally distant from inner and apical teeth; cheeks considerably broader than eyes; carina of prothoracic tubercle barely evident; tegulae rather small, shining, rather deeply and distinctly but sparsely punctate; wings subhyaline, veins more brownish-testaceous, 1st recurrent vein nearly intersitial with the 1st transverse cubitus, 2nd recurrent terminating just beyond tip of 2nd submarginal cell; apical spines of front tibiae reduced to sharp angles, those on mid tibiae well developed, hind tibiae without apical spines; spurs of front tibiae more testaceous-hyaline, mid and hind spurs piceous to black; pubescence short and thin, entirely pale, rather copious but not hiding surface on face around antennae, on cheeks and over most of thorax, very short and thin on abdominal terga; punctures quite deep and distinct in general, rather coarse and distinctly separated around ocelli, on scutum and scutellum, and over much of pleura, becoming densely crowded on clypeus and face below level of antennae; punctures rather fine but deep and distinct, well separated in median area of abdominal terga 1-4, becoming somewhat finer and closer toward the apical margins, these not at all depressed or impunctate; pubescence forming rather indistinct, apical fasciae toward sides of the more basal terga, tergum 5 very closely punctate, 6 and 7 with densely crowded punctures; sterna 1-3 exposed, somewhat shining, basal sternum slightly elevated medially, apical margin straight, narrowly hyaline, 2 rather coarsely and sparsely punctate across disc, with a central, shallow impression, margin straight and narrowly hyaline, 3 rather dull but smooth, largely impunctate, shallowly impressed medially and with a quite prominant, apical fringe of pale hairs; sterna 4-8 retracted, apical margin of 4 with a median comb of very short, robust setae, 5 also with a similar but much more restricted comb, remaining sterna as shown (fig. 14); genital armature much as in *costalis* (fig. 13).

DISTRIBUTION—Texas to Tennessee and North Carolina, April to June.

FLOWER RECORD—*Rubus*.

Stelis (Chelynia) labiata (Provancher) new combination

(Fig. 13)

Chelynia labiata Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 322. ♀ ♂
? *Stelis birkmanni* Cockerell, 1909. Ann. Mag. Nat. Hist. (8) 4, p. 29. ♂.

FEMALE—Length 8 mm.; head, thorax and legs entirely black, abdomen black, with transverse, submedian, narrow, yellow maculations; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus only slightly convex, apical margin very slightly produced medially, having a pair of very low submedian angles delimiting a shallow, median emargination; mandibles 3-dentate, middle tooth subequally distant from apex and inner angle; labrum shining over most of median length, not at all protuberant toward base, apex more distinctly punctured, the punctures extending narrowly up each side toward base; cheeks considerably broader than eyes; transverse carina of prothoracic tubercle very low and barely evident; tegulae shining, with very minute and rather sparse punctures; wings lightly infuscated, veins piceous, 1st recurrent vein distant from base, but 2nd recurrent vein nearly interstitial with the 2nd transverse cubitus; front and mid tibiae with a pair of acute, apical angles but hardly spine-like, hind tibiae with a similar apical angle; pubescence over head and thorax entirely pale, quite short but copious over face, on cheeks, pleura and on propodeum laterally, very short and thin, almost inevident on abdominal terga, becoming more evident on the more apical terga, tergum 6 with rather numerous, erect, fuscous, seta-like hairs; punctures coarse, deep and distinct over head and thorax, becoming densely crowded on lower portion of face and clypeus, crowded elsewhere on head, coarse and crowded on pleura, more distinctly separated on scutum and scutellum; posterior face of propodeum shining above, without a distinct, transverse, dorsal, pitted area; abdominal terga shining, punctures coarse, close and deep, apical margins very narrowly impunctate but black, terga 1-4 with narrow, transverse, yellowish bands which are slightly interrupted medially, 5 with a pair of submedian, yellow spots which are slightly

separated, 6 rather coarsely rugoso-punctate, nearly twice as broad basally as the median length, apical margin broadly triangular; abdominal sterna uniformly, closely and deeply punctate throughout, punctures coarse on the more basal sterna, becoming very fine and densely crowded toward apex, sternum 6 rather broadly rounded.

MALE—Length 8 mm.; head, thorax and legs entirely black, abdomen black, with narrow, transverse, submedian, cream-colored maculations; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus slightly convex, apical margin with a median, slightly produced area which is shallowly emarginate; mandibles 3-dentate, middle tooth equally distant from inner and apical teeth; labrum polished and impunctate medially and toward base, finely punctate at tip and along sides toward base; cheeks somewhat broader than eyes; transverse carina of prothoracic tubercles low but distinct; tegulae shining, with fine, evenly distributed punctures, but these becoming close anteriorly; wings subhyaline, veins piceous to dull testaceous, 2nd recurrent vein joining 2nd submarginal cell near its apex; front and mid tibiae each with a pair of short and acute, apical spines, hind tibiae at most triangularly pointed apically; pubescence entirely pale, rather copious on head and thorax, obscuring surface over lower part of face, elongate on cheeks and over most of thorax, very short and barely evident on abdominal terga; punctures deep and distinct, coarse and quite close over most of head and thorax, finer and densely crowded on lower part of face, more coarse, and distinct on cheeks, vertex, pleura and dorsum of thorax; punctures distinctly but not widely separated on dark areas of abdominal terga, but maculated areas nearly impunctate, these quite narrow, submedian in position, very slightly interrupted medially on terga 1-5, terga 6 and 7 entirely black, coarsely, deeply and very closely punctate, punctures becoming crowded on 6 apically and on 7; abdominal sterna 1-3 exposed, coarsely and quite closely and uniformly punctate, but sternum 3 with a median, impunctate, impressed area which becomes somewhat elevated toward apical rim, these sterna with quite distinct, apical fringes of elongate, whitish hairs; sterna 4-8 retracted, modified as shown (fig. 13) lateral areas of 3-5 with a dense covering of pale ochraceous tomentum; genital armature much as in *costalis* (fig. 13).

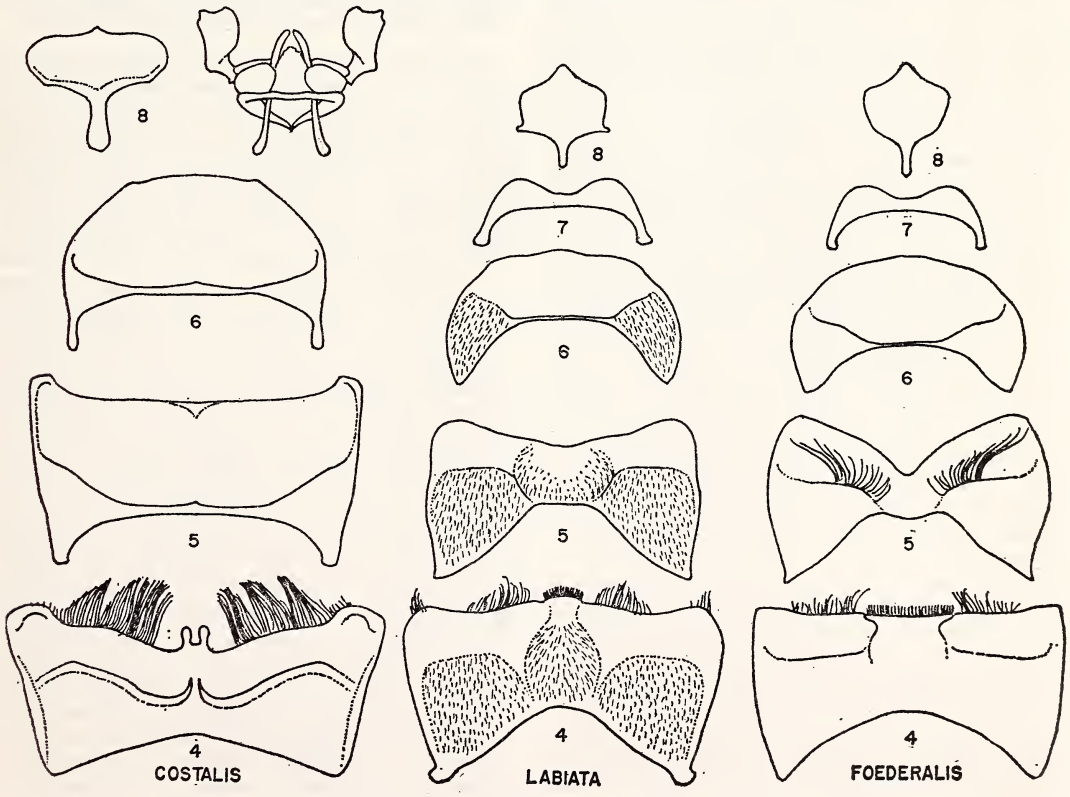


Figure 13—Genital armature and sterna 4-8 in males of *Stelis*.

DISTRIBUTION—Wisconsin to Quebec, south to North Carolina, April to August.

FLOWER RECORDS—*Ranunculus* and *Rubus*.

Stelis (Microstelis) lateralis Cresson

(Fig. 14)

Stelis lateralis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 410. ♀.
Stelis lateralis Robertson, 1898. Acad. Sci. St. Louis, Trans., 8, p. 48. ♂ ♀.
Stelis sexmaculatus Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, p. 153. (biology)
Stelis (*Microstelis*) *lateralis* Swenk, 1914. Univ. Nebr. Studies 14, p. 5. (host)
Stelis lateralis Hicks, 1926. Colo. Univ. Studies 15, p. 217. (biology)
Stelis lateralis Rau, 1928. Psyche 35, p. 100. (biology)
Microstelis lateralis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Stelis lateralis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1048. (larva)
Stelis lateralis Michener, 1955. Kans. Ent. Soc. Jour. 28, pp. 83-86. (biology)

FEMALE—Length 5-6 mm.; head, thorax and legs entirely black, abdomen black, with small, cream-colored maculations; face slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli much nearer margin of vertex than to each other and nearer each other than to eyes; clypeus slightly convex, apical margin with a very slight angle on each side of center; mandibles 3-dentate, middle tooth slightly nearer apical tooth than to inner angle; cheeks subequal to eyes in width; transverse carina of prothoracic tubercles very low and inconspicuous; tegulae rather small, shining, finely and rather closely punctate; wings subhyaline, veins brownish-testaceous; tibiae not spinose apically; spurs pale yellowish; pubescence entirely pale, short, rather copious over head and thorax, very fine and inconspicuous on abdominal terga; punctures quite coarse, deep and distinct, close in general over head and thorax, crowded below antennae, more distinctly separated but still close on scutum, scutellum and pleura, somewhat finer on abdominal terga; apical margins of terga 2-5 very narrowly yellowish-hyaline and impunctate, terga 1-3 with widely separated, lateral, whitish or pale yellowish maculae, 4 and 5 with a pair of more median, very small spots, sometimes with a very small, lateral spot in addition; tergum 6 very broad and short, fully twice as broad as the median length, apical margin broadly angulate, punctures very close, becoming densely crowded across apical margin; abdominal sterna closely, deeply and distinctly punctate, punctures becoming finer and more densely crowded on the more apical sterna, apical margins of 2-5 with a quite dense, apical, greyish fascia.

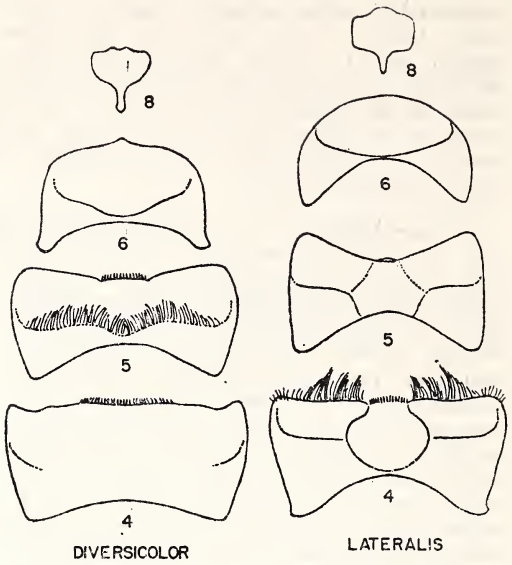


Figure 14
Sterna 4-6 and 8 in males of *Stelis*.

MALE—Length 6-7 mm.; head, thorax and legs entirely black, abdomen black, with lateral, yellowish maculations; face slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli nearer margin of vertex than to each other and slightly nearer each other than to eyes; clypeus quite strongly convex, apical margin slightly and rather broadly produced medially; mandibles 3-dentate, middle tooth about equidistant from inner and apical teeth; cheeks subequal to eyes in width; transverse carina of prothoracic tubercle very low and inconspicuous; tegulae rather small, shining between rather coarse, deep and distinct punctures; wings subhyaline, veins testaceous; front and mid tibiae with very short, barely evident apical angles, these not evident on hind tibiae; spurs pale yellowish; pubescence entirely pale, rather short but quite copious over head and thorax, very short and inconspicuous on abdominal terga; punctures quite coarse, deep and distinct, close in general over head and thorax, slightly separated only over posterior half of scutum, rather fine and close, quite deep and distinct on abdomen; terga 2-5 with very narrow, yellowish-hyaline, impunctate, apical rims; terga 1 and 2 with rather large and conspicuous, widely separated, lateral, pale yellowish maculations, those on 3 more elon-

gate and transverse but still widely separated, 4 and 5 with a pair of submedian but slightly separated, transverse, yellow marks, 6 and 7 without maculae, with coarse, crowded punctures; abdominal sterna 1-3 exposed, black, rather conspicuously whitish fasciate apically, sternum 2 slightly protuberant near middle, punctures quite coarse, deep, distinct and close, 4-8 retracted, 4 with a median, circular, depressed area at apex of which is a rather narrow apical comb, remaining sterna as shown (fig. 14); genital armature much as in *costalis* (fig. 13).

DISTRIBUTION—North Dakota to Ontario and Maine, south to Georgia, March to July.

FLOWER RECORDS—*Chrysanthemum* and *Rubus*. Recorded by Robertson (1929) on *Apocynum, Cerastium, Coreopsis, Erigeron, Geranium, Krigia, Potentilla, Rhus* and *Zizia*.

HOSTS—*(Alcidamea simplex)* = ? *Robertsonella simplex* (Cresson); *Hoplitis pilosifrons* and *H. producta*.

Stelis (Microstelis) plenum (Provancher)

Heriades plenum Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym. p. 425. ♂.

This has been synonymized with *lateralis*, but examination of the type suggests the probability that it is not that species. It does not quite agree with any of the eastern species of *Stelis*, but it is possible that it is a variant of one of them, or of some western species. The following brief description was made of the type specimen:

MALE—Length 4 mm.; head and thorax entirely black, tegulae and legs ferruginous; abdominal terga 1-3 with small, lateral, yellow maculae, 4 and 5 with a median pair which are slightly separated at midline; both recurrent veins interstitial with the transverse cubital veins; puncture close and deep on head and thorax, scutellum somewhat triangular, punctures separated by about their own diameters; abdominal terga more finely and sparsely punctate, interspaces two or three times their diameter, tergum 6 closely punctate, entirely black, 7 short, transverse; sternum 3 with a conspicuous apical fringe.

DISTRIBUTION—? Quebec.

Stelis (Microstelis) vernalis new species

FEMALE—Length 6-7 mm.; head, thorax and legs entirely black, abdomen black, with a pair of very small, lateral, cream-colored maculations on terga 1 and 2; face very slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, much nearer margin of vertex; clypeus quite flat, apical margin straight; mandibles rather flat, slightly reddened toward teeth, 3-dentate, middle tooth very low, subequally distant from inner and apical teeth; labrum not at all protuberant basally, quite evenly, closely and finely punctate throughout; cheeks slightly broader than eyes; transverse carina of prothoracic tubercles short but distinct; tegulae rather large, shining, finely and quite closely punctate; wings hyaline basally, becoming slightly smoky apically and in region of marginal cell, veins piceous, 2nd recurrent vein nearly interstitial with 2nd transverse cubitus; hind tibiae with a triangular, acute, apical projection, the front and mid tibiae each with pair of short, acute, spine-like projections; spurs pale yellowish; pubescence entirely pale, very short and thin, somewhat more copious but not hiding surface around antennae, on cheeks below and on thorax laterally; punctures deep and distinct, quite coarse, uniformly close over head and thorax, being fine and densely crowded on clypeus, much more coarse on pleura, uniformly close but not crowded on scutum and scutellum; posterior face of propodeum polished, shining and impunctate, with a narrow, distinct, dorsal, pitted area; abdominal terga shining, punctures deep and distinct, rather coarse, slightly separated medially on terga 1-5, becoming somewhat closer at extreme sides, apical margins very narrowly yellowish-hyaline and impunctate; terga 1 and 2 with very small, cream-colored, lateral spots; tergum 6 with a quite deep, subapical groove, disc with coarse, crowded punctures; abdominal sterna closely punctate, the more basal sterna coarsely so, punctures becoming finer but distinct on the following sterna, those on 5 uniformly deep, distinct and close.

MALE—Length 5 mm.; head, thorax and legs entirely black, abdomen black, with small, lateral, yellowish maculations on the more basal terga; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus slightly convex, apical margin nearly straight; mandibles slightly reddened toward apex, 3-dentate, middle tooth about equidistant from inner and apical teeth; labrum smooth and shining, not at all protuberant basally, with scattered, deep and distinct but fine punctures; cheeks very

slightly narrower than eyes; transverse carinae of prothoracic tubercles low but distinct; tegulae rather small, smooth and shining, but with rather close, deep and distinct punctures; wings subhyaline, becoming somewhat infuscated in region of marginal cell, veins piceous to testaceous, 2nd recurrent vein about interstitial with 2nd transverse cubitus; front and mid tibiae with a pair of very short, acute, apical spines, the hind tibiae at most with an apical angle; spurs pale yellow; pubescence entirely pale, very short, thin and inconspicuous, not obscuring surface in any part of body; punctures coarse, deep and distinct, rather uniformly close and coarse over most of head and thorax, being somewhat coarser on vertex, pleura and scutellum where they are not quite so crowded; posterior face of propodeum smooth and shining, with a few shallow, scattered punctures and with a distinct, narrow, dorsal, pitted area; abdominal terga smooth and shining, punctures deep and distinct, well separated medially on terga 1-3, becoming somewhat closer laterally, apical margins narrowly yellowish-hyaline and impunctate, with lateral, widely separated yellowish maculae, a similar vestigeal pair on 4; sterna 5-7 closely, deeply and uniformly punctate; abdominal sterna 1-3 exposed, very coarsely, closely and deeply punctate, 3 with a rather broad, concave, median area which is thickened along its apical margin, and has a very short, apical fringe, this practically lacking laterally, 1 and 2 with very narrow, apical fringes; sterna 4-8 retracted, form very similar to *labiata* (fig. 13); gonostyli much as in *costalis* (fig. 13).

Types—Holotype: Female, Holly Shelter Game Refuge, Pender Co., N. C., April 25, 1953 (Mitchell). Allotype: Hillsgrove, Pa., July 23, 1931 [both author's coll.]. Paratypes: MICHIGAN: 1♀, Douglas Lake, Cheboygan Co., (? June 7 or July 6), 1930 (C. J. D. Brown); 1♂, Mason Co., (date obliterated) (Dreisbach); 1♀, Huron Co., June 29, 1922 (R. F. Hussey); 1♂, Charlevoix Co., July 3, 1939 (Bullock and Dreisbach); MINNESOTA: 1♂, Climax July 8, 1935 (D. G. Denning).

Paratypes are in collections of the University of Michigan, the U. S. National Museum, the University of Minnesota and R. R. Dreisbach.

Stelis (Stelidium) trypetina (Robertson)

Stelidium trypetinum Robertson, 1902. Canad. Ent. 34, p. 232. ♀.

Stelis (*Stelidium*) *ontariana* Sladen, 1916. Canad. Ent. 48, p. 312. ♀♂.

Stelis (*Stelidium*) *trypetina* Cockerell, 1922. Canad. Ent. 54, p. 143.

Stelidium trypetinum Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 5 mm.; black, with very small, cream-colored maculations on head and abdomen; a pair of narrow, slightly separated maculations along inner orbits and a narrow, transverse maculation back of each eye, near margin of vertex; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, and slightly nearer each other than to eyes; clypeus nearly flat, apical margin nearly straight; mandibles 3-dentate, middle tooth slightly nearer inner angle than to apical tooth; labrum with a median, basal, triangular, polished and impunctate area, densely and finely punctate on each side and apically; cheeks subequal to eyes in width; transverse carina of prothoracic tubercles very low, barely evident; tegulae shining, uniformly, closely and deeply punctate; wings faintly smoky, veins piceous, recurrent veins received well within base and apex of 2nd submarginal cell; front tibiae without distinct, apical spines, mid tibiae with a pair of very short, acute spines, and hind tibiae with single, triangular, spine-like, apical projection; spurs yellowish, mid tibial spur very short; pubescence entirely pale, very short and thin, rather dense but not hiding surface around antennae and over lower half of face, somewhat more copious on pleura, thin on abdominal terga, but forming rather definite, apical fasciae toward sides on terga 1-4; punctures coarse, deep and distinct in large part, close and coarse over most of face and cheeks, but becoming finer and more dense on clypeus and sides of face; punctures coarse and close over most of thorax, posterior face of propodeum polished, shining and impunctate, with a narrow, pitted area across dorsal margin; discs of abdominal terga quite coarsely and deeply punctate, punctures slightly separated medially, becoming densely crowded toward sides, apical margins narrowly depressed, shining, impunctate and yellowish-hyaline; terga 3-6 gradually narrowed, resulting in a conicle form of the abdomen, tergum 6 triangular posteriorly, coarsely and deeply punctate, much exceeded by the elongate and broadly rounded 6th sternum; sterna 1-5 coarsely and closely punctate, with quite dense, apical fringes of elongate white hairs, 6 very minutely and closely punctate except around the dull testaceous, more nearly impunctate margin.

DISTRIBUTION—Illinois to Virginia, August and September.

FLOWER RECORD — *Pycnanthemum.* Recorded by Robertson (1929) on *Aster. Erigeron, Rudbeckia* and *Solidago.*

Stelis foederalis Smith

(Figs. 12 & 13)

Stelis foederalis Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 275. ♀ ♂.

Chelynia foederalis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8 mm.; head, thorax and legs entirely black, abdomen with transverse, narrow, submedian, yellowish bands on terga 1-5, that on 1 very slightly interrupted medially, the others complete; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, more distant from eyes; clypeus slightly convex, apical margin nearly straight; mandibles 3-dentate, the teeth low and about equally distant from each other; labrum smooth and shining, little if any protuberant at base; cheeks slightly broader than eyes; prothoracic tubercles with a low, inconspicuous carina; tegulae rather expansive, shining, minutely and rather sparsely punctate, largely black; wings subhyaline, veins piceous; spurs of front legs yellowish-hyaline, those on mid and hind pair blackish; front and mid tibiae each with a pair of rather short, acute, apical spines, hind tibia with a single spine; pubescence very short, thin and inconspicuous, apparently entirely pale, the more apical abdominal terga with considerable erect, seta-like pubescence; punctures rather deep and distinct in general, very fine and close over face, becoming somewhat coarser above and on vertex, close and rather coarse on cheeks, slightly separated on the shining scutum and scutellum, somewhat coarser on scutellum, very close and coarse on pleura; abdominal terga shining, very sparsely punctate across median area of discs, becoming more closely punctate toward basal and apical margins, without a distinct, impunctate, apical rim, tergum 6 rather finely and shallowly reticulate; abdominal sterna uniformly, very finely and closely punctate, the apical sternum with a robust, median, elongate spine which protrudes conspicuously from tip of abdomen, superficially resembling a sting.

MALE—Length 7-8 mm.; head, thorax and legs entirely black, abdomen with transverse, narrow, submedian, yellow bands on terga 1-5, these slightly interrupted on 1-3; face somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from margin of vertex and each other, more distant from eyes; clypeus quite flat, apical margin nearly straight, but with a pair of barely perceptible protuberances on each side of center; cheeks somewhat broader than eyes; prothoracic tubercles with a very low but distinct carina; tegulae black, shining, minutely and rather sparsely punctate wings subhyaline, veins piceous; front and mid tibiae each with a pair of short but acute, apical spines, hind tibiae angulate apically but hardly spinose; spurs of front tibiae yellowish-hyaline, mid and hind pair more blackish; pubescence entirely pale, rather copious over head and thorax, nearly hiding the surface of lower part of face, quite elongate on cheeks below, copious over dorsum and venter of thorax and basal portions of legs, very thin and inconspicuous on abdominal terga, but apparently entirely pale, somewhat more copious on tergum 6; punctures quite deep and distinct in general, rather coarse on cheeks and upper part of face and vertex, becoming minute and densely crowded on clypeus and lower portions of face; punctures deep, distinct and quite coarse and close over entire thorax, being almost crowded on entire scutum and scutellum; abdominal terga largely impunctate across median area of each disc, these becoming more distinctly, closely and coarsely punctate toward base and apex, tergum 6 closely punctate throughout, more finely so toward basal margin, tergum 7 with fine, almost crowded punctures; abdominal sterna 1-3 exposed, not much modified, punctures quite close, deep and distinct, 2 and 3 with rather elongate, posterior fringes of white pubescence, 3 with a median, elevated, protuberant area at mid point; sterna 4-8 retracted and highly modified, 4 with a median, apical comb, margin on each side with a fringe of more elongate pubescence, other sternal plates as shown (fig. 13); genital armature much like that of *costalis* (fig. 13).

DISTRIBUTION—Minnesota to New Brunswick, south to Georgia, May to July.

FLOWER RECORD—Recorded by Robertson (1929) on *Chrysanthemum leucanthemum.*

Stelis michiganensis new species

FEMALE—Length 6 mm.; head, thorax and legs entirely black, abdomen with transverse, yellow maculations; face very slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant

from eyes; clypeus somewhat convex, apical margin nearly straight; mandibles 3-dentate, middle tooth subequally distant from inner angle and apical tooth; cheeks subequal in width to eyes; labrum polished and impunctate, not noticably protuberant at base; carina of prothoracic tubercle low but quite distinct; tegulae piceous, shining, only very minutely and sparsely punctate; wings subhyaline, veins rather pale testaceous except for the more piceous marginal veins; front and mid tibiae each with a pair of short, acute, apical spines, hind tibia with a single, short, triangular spine; anterior spurs testaceous-hyaline, mid and hind spurs more piceous; pubescence entirely pale on head and thorax, quite copious but rather thin and not completely hiding the surface; punctures coarse, deep and distinct, quite coarse over upper part of face and on cheeks, becoming densely crowded and rather fine on clypeus and sides of face below antennae, coarse and well separated over most of scutum and on scutellum, very close on pleura, and close, minute and shallow on propodeum laterally, posterior face of propodeum dull, tessellate, with a dorsal very narrow, pitted area; abdominal terga shining, 1-4 finely and sparsely punctate medially, becoming somewhat closer toward sides, 5 more closely punctate, 6 reticulate; tergum 1 with a pair of small, widely separated, lateral, yellow spots, 2-4 with transverse, narrow, submedian maculae which are distinctly but not widely separated medially, 5 with a pair of short, transverse, submedian maculations; pubescence sparse and erect, pale on the more basal terga, becoming blackish on 3-6, quite dense and erect on 6; abdominal sterna closely, finely and uniformly punctate, sternum 6 with minute and densely crowded punctures, apical margin nearly straight, and with a median, elongate, robust, black spine.

TYPE—Holotype: Female, Luce Co., Mich., July 8, 1946 (Dreisbach).

This species is closely related to *foederalis* and *nitida*, and would be included with them in any subgeneric grouping.

Stelis nitida Cresson

Stelis ? *nitida* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 92. ♀.

Chelynia nitida Titus, 1905. Ent. Soc. Wash. Proc. 7, p. 162.

FEMALE—Length 11 mm.; head, thorax and legs entirely black, abdomen with median, transverse, uninterrupted yellow bands on terga 1-5; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus slightly convex, apical margin nearly straight, but with a very shallow emarginate area on each side; mandibles 3-dentate, middle tooth slightly nearer inner angle than to apical tooth; cheeks much broader than eyes; prothoracic tubercle with a barely discernable carina; tegulae quite expansive, smooth and shining, with very sparse and minute punctures, these becoming somewhat closer toward anterior margin; wings subhyaline, veins piceous, recurrent veins entering 2nd submarginal cell well within the base and apex; tibiae with short, apical spines, front and mid pair with two spines, hind pair with one very short, triangular, spine-like projection; front spurs somewhat brownish, with hyaline margin toward base, mid and hind spurs more piceous; pubescence entirely pale, quite copious on head and thorax, somewhat thinner above, quite dense on face, cheeks below, pleura and venter of thorax, pale and very thin on the more basal abdominal terga, becoming more copious, long, erect and black toward the apex, tergum 6 quite densely covered with erect, black setae; punctures quite deep and distinct over most of head and thorax, close and coarse on cheeks, upper part of head, pleura and scutellum, very fine and densely crowded below antennae, quite sparse and irregular on shining scutum; terga 1-5 with very sparse and rather fine punctures across central portions of discs, these becoming more closely punctate toward base and apex, tergum 6 rather coarsely reticulate beneath the pubescence; abdominal sterna somewhat shining, punctures minute and rather well separated but not sparse, becoming more densely crowded toward apical segments; sternum 6 deeply emarginate apically, with an elongate, erect, robust, blackish spine protruding from mid point of this emargination.

MALE—Length 8-8.5 mm.; head, thorax and legs entirely black, abdominal terga 1-5 with median, transverse, yellow bands, those on the more basal terga very slightly interrupted medially, tergum 6 with a pair of small, subapical, yellow spots; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli very slightly nearer margin of vertex than to each other, more distant from eyes; clypeus rather flat, apical margin with a very slight, median, emargination; mandibles 3-dentate, middle tooth slightly nearer inner angle than to apical tooth; labrum smooth and shining, with no perceptible basal protuberance; cheeks much broader than eyes; transverse carina of prothoracic tubercle very poorly developed; tegulae rather expansive, smooth and shining, with minute, sparse punctures; wings subhyaline,

veins more brownish-testaceous, recurrent veins entering 2nd submarginal cell within base and apex; front and mid tibiae each with a pair of short, acute, apical spines, hind tibia angulate but not spinose at tip; front spurs more testaceous, mid and hind pair piceous; pubescence entirely pale, quite copious over head and thorax, being elongate even on dorsum of thorax, dense and obscuring the surface on face below antennae, very sparse and inconspicuous on abdominal terga, but becoming more copious and conspicuous on the more apical segments; punctures rather coarse and deep over most of head and thorax, close but distinct on cheeks, vertex and upper part of face, becoming minute and densely crowded on clypeus and face below, close on pleura and on scutum anteriorly, but becoming rather distinctly separated in center of scutum posteriorly and on scutellum; discs of abdominal terga very sparsely punctate across median area, punctures becoming more distinct basally and apically on each disc, rather fine toward the apical margin, well separated, becoming quite close but distinct on tergum 6, tergum 7 finely and very closely punctate; abdominal sterna 1-3 exposed, somewhat shining, punctures close and rather distinct laterally, but becoming quite sparse, minute and well separated or absent in the median area, sternum 3 with a median, apical, protuberant area which does not project beyond the apical margin; sterna 4-8 retracted, much modified, closely resembling those of *foederalis*, (fig. 13); genital armature much as in *costalis*.

DISTRIBUTION—Described from New York. Collected in North Carolina, in June.

FLOWER RECORD—*Chrysanthemum.*

Stelis subemarginata Cresson

Stelis ? *subemarginata* Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 93. ♀.
Stelis subemarginata Swenk, 1915. Nebr. Univ. Studies 15, p. 191. ♂.
Stelis subemarginata Graenicher, 1935. Ent. Soc. Am. Ann. 28, p. 300. (host)

FEMALE—Length 8mm.; head, thorax and legs entirely black, abdomen black, with transverse, yellow maculae; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex, eyes and each other; clypeus rather flat, apical margin with a pair of conspicuous tubercles delimiting a shallow, median, emarginate area; mandibles 3-dentate, middle tooth quite low, slightly nearer inner angle than to apical tooth; cheeks somewhat broader than eyes; basal half of labrum polished and impunctate, apical part quite deeply and distinctly punctate, this area extending narrowly along sides toward base; transverse carina of prothoracic tubercles low but distinct; tegulae rather small, shining, minutely and rather sparsely punctate; wings faintly infuscated, veins more testaceous, recurrent veins received by 2nd submarginal cell well within base and apex, hind tibiae not spinose apically, front and mid tibiae each with a pair of very short, acute, spine-like projections; front spurs pale testaceous, mid and hind spurs piceous; pubescence of head and thorax rather short but copious, pale in general, but face, vertex and dorsum of thorax with scattered, erect, blackish hairs intermixed in the white, abdominal terga with erect and rather sparse but conspicuous, blackish hairs; punctures of head and thorax quite deep and distinct, very close on cheeks and over most of face, slightly separated between eyes and ocelli, close and coarse on pleura, coarse and slightly separated on scutum and scutellum; posterior face of propodeum shining above, with a rather indefinite, transverse, rugose area, but without distinct pits; abdominal terga smooth and shining, with rather fine, sparse punctures, these becoming slightly closer toward the depressed apical margins which are largely impunctate and black; terga 1-5 with bright yellow, narrow, transverse bands which are very slightly interrupted medially, tergum 6 almost as long as the base is broad, with rather fine, somewhat separated punctures which become densely crowded at tip; abdominal sterna finely, densely and distinctly punctate, the punctures becoming minute and densely crowded apically, sternum 6 quite broadly rounded.

DISTRIBUTION — According to the Catalog of Hymenoptera (1951, p. 1149) this occurs from Idaho and Wyoming, to Wisconsin, Ontario and New Brunswick. It has been collected by this writer in Colorado in July, at an elevation of 9,500 ft.

HOST — *Osmia simillima.*

Table 2—Distribution of species of *Stelis* and *Heterostelis* by states.

	New England						North Central						Mid Atlantic								South-eastern					
Stelis	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
ater																											X
costalis												X							X			X				X	X
c. floridana																											X
diversicolor																					X	X					
foederalis																										X	
labiata						X	X	X							X							X					
lateralis	X	X		X			X	X			X		X		X	X		X	X			X				X	
michiganensis								X																			
nitida													X									X					
plenum (Quebec)																											
subemarginata							X																				
trypetina									X										X								
vernalis								X							X							X					
Heterostelis																											
australis														X								X				X	
a. floridensis																											X
grossa																											X

Heriades Spinola

(Fig. 1)

Heriades Spinola, 1808. Insectorum Liguriae 2, p. 7. Type: *Apis truncorum* Linnaeus. Desig. by Latreille, 1810.

Trypetes Schenck, 1859. Nassau Ver. f. Naturk. Jahrb. 14, p. 32. Preocc. Type: *Apis truncorum* Linnaeus. Monob.

Neotrypetes Robertson, 1918. Ent. News 29, p. 92. Type: (*Trypetes productus* Robertson) = *Megachile variolosa* Cresson. Monob. and orig. desig.

Heriades subg. *Physostetha* Michener, 1938. Ent. Soc. Amer. Ann. 31, p. 523. Type: *Heriades carinata* Cresson. Orig. desig.

Heriades subg. *Neotrypetes* Michener, 1954. Kans. Ent. Soc. Jour. 27, p. 68. (key)

Heriades is a group of small, compact, more or less parallel-sided, black bees which are very coarsely and deeply punctate. The basal abdominal tergum is broadly concave anteriorly, the margin of this concavity sharply carinate; the posterior face of the propodeum is perpendicular, but with a narrow, distinct, dorsal area which is deeply pitted; the metanotum forms a part of the dorsal surface of the thorax, posterior to the rounded scutellum; and the axillae are small and inconspicuous. The notaulices of the scutum are linear, and the pleura are not carinate anteriorly, but the prothoracic tubercles have distinct, transverse carinae. In the front wings both recurrent veins are received well within the base and apex of the 2nd submarginal cell, and the stigma is quite large. Arolia are present; the maxillary palpi are 3-segmented; the female mandibles are tri-dentate, those of the males bi-dentate; and the abdominal terga have distinct, white apical fasciae. In the males the apical abdominal terga are strongly flexed, the margin of tergum 7 meeting that of sternum 3, with sterna 4-8 retracted and modified.

KEY TO SPECIES

Females

1. Carinae of mandibles united basally, a slight angle at this point of union .... *carinata* Cresson
   Carinae of mandibles separate to the base 2
2. Punctures of tergum 2 noticeably finer than those of 3; wings relatively clear, darkened only in region of marginal cell ..... *variolosa* Cresson (p. 51)
   Punctures of terga 2 and 3 not noticeably different; apical half of wings becoming rather deeply infuscated .... *leavitti* Crawford (p. 50)

Males

1 Abdominal sternum 1 truncate apically, with a robust, conical, median protuberance ..... *carinata* Cresson
  Sternum 1 produced apically, either rounded or angulate, only very slightly protuberant 2
2. Sternum 1 angulate apically, and with a low protuberance at about a third of the median length from apex..... ..... *variolosa* Cresson (p. 51)
   Sternum 1 more rounded apically, protuberance nearer mid point of plate .. .. *leavitti* Crawford (p. 50)

Heriades (Physostetha) carinata Cresson

(Fig. 15)

Heriades carinatum Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 383. ♀ ♂.

Heriades glomerans Schletterer, 1889. Zool. Jahrb., Abt. f. System. Geog. u. Biol. Tiere 4, p. 681. ♀.

Heriades carinatus Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7), p. 39. (biology)

FEMALE—Length 7mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus less than half as long as its greatest breadth, median portion of apical margin straight, this area bordered on each side by a distinct and more or less erect tubercle; labrum with a median, apical, more or less erect, acute tubercle; mandibles tri-dentate, middle tooth approximate to the apical tooth, outer margin with a slight, median angle where the lower mandibular carinae unite; cheeks somewhat broader than eyes; wings hyaline basally becoming lightly infuscated apically, stigma brownish, veins more testaceous; tegulae brownish, somewhat shining, very minutely and obscurely punctate; legs entirely dark, spurs pale yellowish; pubescence short, thin, entirely pale, somewhat more dense on clypeus and along inner orbits, on cheeks below and thorax laterally and posteriorly, elsewhere exceedingly sparse, short and thin; abdominal terga 1-4 with white apical fasciae evident laterally on the more basal plates, entire on 3 and 4; discal pubescence very short, thin, sparse, barely visible except on the more apical terga; scopa pale yellowish; punctures very coarse, deep and distinct, close in general, coarsely crowded on face just below ocelli, becoming very fine and densely crowded on clypeus, coarse and close on cheeks, scutum, and over much of pleura, being somewhat more distinctly separated on mesopleura posteriorly and on scutellum; punctures very coarse and quite close on abdominal terga laterally and toward basal margin medially, 4-6 more uniformly, coarsely and very closely punctate, 6 almost rugoso-punctate.

MALE—Length 7 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, somewhat more distant from margin of vertex; clypeus only slightly broader than its median length, somewhat swollen medially, apical margin nearly straight, slightly produced at each side; labrum with a low, median, basal protuberance; mandibles bidentate; cheeks somewhat narrower than eyes; wings hyaline basally, becoming rather deeply infuscated apically and in marginal cell, veins and stigma piceous; tegulae smooth and shining, nearly black; legs entirely black, spurs pale yellowish; basal abdominal sternum with a robust, median protuberance, apical margin broadly produced and truncate; sternum 2 fully exposed, somewhat swollen medially on each side, apical margin rather broadly outcurved, smooth and shining; sternum 3 largely hidden, and sterna 4-8 entirely retracted, form as shown (fig. 15); genital armature as shown; pubescence short, thin, entirely pale, somewhat more copious on lower inner orbits and clypeus, quite dense and elongate on cheeks below, and with a rather distinct, erect, whitish fringe around lateral and posterior margins of scutum and scutellum; abdominal terga 2-4 with very narrow but entire, whitish, apical fasciae, tergum 1 fasciate toward the sides; discal pubescence of terga very short, thin and sparse, apparently entirely pale; punctures coarse, close and deep in general, much finer but densely crowded below antennae and on clypeus, rather coarse on lateral faces of propodeum, posterior face shining, with scattered, irregular and much finer punctures; punctures very coarse and close over most of abdominal terga, somewhat finer and more distinctly separated on median area of

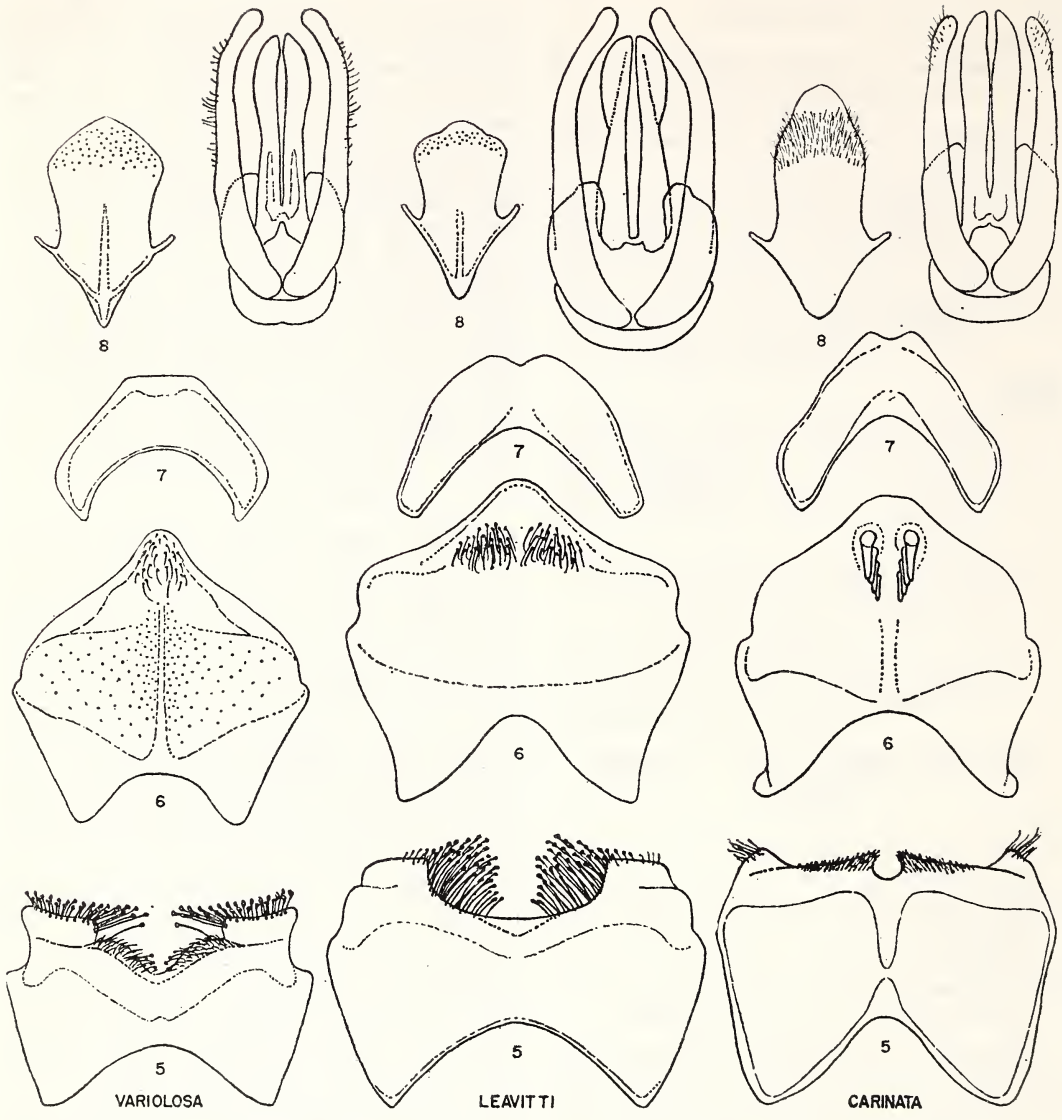


Figure 15—Genital armature and sterna 5-8 in males of *Heriades*.

2 and 3, 4 and 5 with densely crowded punctures, 5 becoming more rugose apically, 6 somewhat shining, punctures distinctly but not widely separated; sternum 2 dull, coarsely rugoso-punctate at extreme sides but becoming very finely so medially.

DISTRIBUTION — British Columbia to Maine, south to Florida, April to Aug.

FLOWER RECORDS — *Apocynum, Aronia, Asclepias, Erigeron, Fagopyrum, Ilex, Melilotus, Potentilla, Rubus, Senecio* and *Trifolium*.

Heriades (Neotrypetes) leavitti Crawford

(Fig. 15)

Heriades leavitti Crawford, 1913. Canad. Ent. 45, p. 270. ♂.

Heriades crawfordi Graenicher, 1928. Ent. News 39, p. 281. ♀ ♂.

? *Neotrypetes truncatus* Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7 mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below;

lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus broadly convex, apical margin shallowly concave medially, minutely crenulate on each side; mandibles slightly broadened apically, with a low, subapical tooth which is considerably removed from the inner angle; cheeks subequal to eyes in width; wings hyaline basally, becoming lightly infuscated apically, veins and stigma piceous; tegulae piceous, smooth and shining; legs entirely black, spurs pale yellowish; pubescence very short and thin, entirely pale, somewhat more copious at sides of face, cheeks below, around tubercles and wing bases; abdominal terga 1-5 with narrow, entire, whitish, apical fasciae, discal pubescence hardly evident toward base, becoming somewhat more distinct toward apex; scopa entirely pale; punctures of head and thorax very coarse, close and distinct, but clypeus and face below antennae more finely rugoso-punctate, thoracic punctures more definitely separated but still very close; posterior face of propodeum sharply differentiated from the narrow, dorsal, pitted area and lateral faces by a distinct marginal carina, surface rather dull, closely but rather finely punctate; punctures of abdominal terga not quite so coarse, well separated on discs of 2-4 medially, but becoming closer and coarser toward sides, quite close over most of 5, 6 more finely and densely punctate; abdominal sterna yellowish-hyaline apically, discs closely and deeply punctate, rather finely so toward apical margin of each, those on 6 quite close and fine but distinct.

MALE—Length 7 mm.; entirely black; face much longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex, eyes, and each other; apical margin of clypeus straight, the thickened edge smooth; mandibles bi-dentate; cheeks somewhat narrower than eyes; wings hyaline basally, becoming lightly infuscated apically, veins and stigma piceous; tegulae piceous, smooth and shining, with only microscopic punctures evident; legs largely black, spurs yellowish, front femora and tibiae ferruginous along upper and anterior surfaces; abdominal sterna 1 and 2 exposed, sternum 1 produced medially nearly to margin of 2, this area rounded or obscurely angulate, with considerable short and dense pubescence at center; sterna 3-8 retracted, form as shown (fig. 15); genital armature as shown; pubescence very short, thin, entirely pale, quite dense along sides of face, on cheeks below and over lateral portions of clypeus; scutellum with a rather conspicuous, erect fringe of whitish hairs posteriorly; terga 1-4 with narrow, whitish, apical fasciae, that on 1 rather widely interrupted medially, 5 not fasciate; punctures very coarse, close and deep over most of head and thorax, but face below antennae more finely rugoso-punctate, clypeus very finely so apically; punctures of abdominal terga not quite so coarse, very close in large part, tergum 5 and median area of 6 rather densely rugoso-punctate but these becoming more distinct laterally and toward apex.

DISTRIBUTION — Illinois to Maine and New Brunswick, south to Florida, March to October.

FLOWER RECORDS — *Anthemis, Bidens, Chrysopsis, Erigeron, Galax, Helenium, Ilex, Jussiaea, Oenothera, Polygonum, Senecio, Solidago* and *Stokesia.* Robertson (1929) includes a long list of plants visited by *Neotrypes truncatus* MS. This was never described, but he indicates that there was some confusion with *N. productus* (= *variolosa*) as to the identity of the females. It seems probable, therefore, that *leavitti* is the species he had before him.

Heriades (Neotrypetes) variolosa variolosa (Cresson)

(Fig. 15)

Megachile variolosa Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 270. ♀.

Heriades odontophora Schletterer, 1889. Zool. Jahrb. Abt. f. System. Geog. u. Biol. Tiere 4, p. 679. ♀.

Heriades asteris Cockerell, 1897. Ann. Mag. Nat. Hist. (6) 20, p. 135. ♂.

Trypetes barbatus Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171. ♂. (♀ misdet.)

Trypetes productus Robertson, 1905. Canad. Ent. 37, p. 236. ♂.

Neotrypes barbatus and *N. productus,* Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Heriades variolosus Fischer, 1955. Canad. Ent. 87, p. 33. (biology)

FEMALE—Length 6 mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, somewhat more widely removed from each other; clypeus almost flat, median third of apical margin rather strongly concave or shallowly emarginate, with a low tubercle on each side of this area; mandible with a low, subapical, inner tooth which is considerably removed from inner angle; cheeks much narrower than eyes; wings subhyaline, only very faintly dusky toward marginal cell, veins and stigma piceous; tegulae piceous, smooth and shining; legs entirely black, spurs pale yellow; pubescence very short, thin, en-

tirely pale, somewhat more copious along inner margin of eyes, on cheeks below, on tubercles, behind wing bases, and an erect, posterior fringe around scutellum; terga 1-6 with narrow, entire, whitish, apical fasciae, discal pubescence hardly evident, but becoming somewhat more definite toward the apex; scopa entirely white; punctures very coarse, close and deep over entire head and thorax, but face below antennae more irregularly and finely rugoso-punctate; posterior face of propodeum below the narrow, pitted, upper margin somewhat smooth and shining, with scattered, shallow punctures; punctures of abdominal terga 1 and 2 rather fine but quite close medially, becoming coarse and close laterally, those on 3 conspicuously coarser and quite close, those 4 and 5 not quite so coarse but very close, 6 rather finely rugoso-punctate.

MALE—Length 5 mm.; entirely black; face much longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, much more widely removed from each other; surface of clypeus obscured by a dense brush of elongate, white pubescence, apical margin about straight; mandibles bi-dentate; cheeks about half width of eyes; wings hyaline basally, becoming very faintly smoky apically, veins and stigma more brownish-testaceous; tegulae brownish-piceous, smooth and shining; legs largely black, but front femora and tibiae more or less ferruginous on upper and anterior faces; spurs pale yellow; sternum 1 somewhat swollen, strongly produced apically, acutely pointed medially, without pubescence; sterna 3-8 retracted, form as shown (fig. 15); genital armature as shown; pubescence short, thin, entirely pale, short and dense along lower inner orbits between eyes and clypeus, very dense and elongate on clypeus; terga 1-4 with narrow, whitish, apical fasciae, discal pubescence hardly evident on the more basal terga, but becoming rather dense but still very thin on terga 4-6; punctures very coarse, close and deep over most of head and thorax, becoming finer, dense and irregular below antennae; posterior face of propodeum, below the carinate upper margin, smooth and shining, with scattered, irregular punctures; abdominal terga 1 and 2 rather finely but closely punctate medially, becoming coarsely so toward sides, 3 and 4 conspicuously more coarsely punctate, punctures becoming closely crowded on 4-6.

DISTRIBUTION — British Columbia to Maine, south to Texas and Florida, March to October.

FLOWER RECORDS — *Apocynum, Berteroa, Brassica, Ceanothus, Coreopsis, Senecio, Solidago* and *Toxicodendron.* Robertson (1929) records this species (as *Neotrypes barbatus* and *N. productus*) on the following additional genera: *Asclepias, Aster, Bidens, Blephilia, Erigeron, Houstonia, Parthenium* and *Trifolium.*

The occurrence of another form of *variolosa* in Mexico and southern Texas makes the subspecific designation of this typical form necessary.

Prochelostoma Robertson

(Fig. 1)

Prochelostoma Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 167. Type: *Heriades philadelphi* Robertson. Monob. and orig, desig.

Prochelostoma Michener, 1938. Ent. News 69, p. 131.

The single species in this genus is a small, narrow and elongate, rather finely punctured, black bee. The basal abdominal tergum is sulcate anteriorly; the posterior face of the propodeum is sloping, the dorsal area coarsely reticulate and forming a part of the dorsal surface of the thorax, with the metanotum also dorsal, just posterior to the rounded scutellum. The axillae are small and poorly differentiated from the lateral margins of the scutellum; the notaulices are linear; neither the pleura nor the tubercles are carinate; arolia are present; and the front wings have a large stigma, with both recurrent veins received well within the base and apex of the 2nd submarginal cell. The maxillary palpi are 4-segmented; the female mandibles are tri-dentate, those of the males bi-dentate; and the abdominal terga are not fasciate. Tergum 7 of the male is conspicuously bidentate apically, and sterna 5-7 are retracted.

Prochelostoma philadelphi (Robertson)

(Fig. 16)

Heriades philadelphi Robertson, 1891. Amer. Ent. Soc. Trans. 18, p. 64. ♀ ♂.

Prochelostoma philadelphi Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 167.

Prochelostoma philadelphi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Prochelostoma philadelphi Krombein, 1959. Ent. News 70 (5), p. 135. (biology)

FEMALE—Length 8 mm.; entirely black; face much longer than distance between eyes;

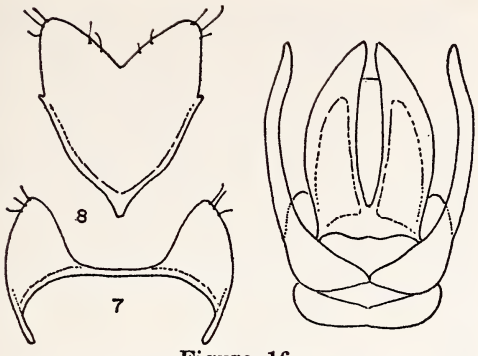


Figure 16
Genital armature and sterna 7 and 8 in males of *Prochelostoma philadelphi*.

eyes subparallel; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus fully twice as broad as its median length, somewhat sloping medially, margin slightly protuberant at each extreme side; mandibles narrow and elongate, 3-dentate, with a narrow, median, apical protuberance; wings subhyaline basally, becoming lightly infuscated apically, stigma piceous, veins more brownish-testaceous; tegulae smooth and shining, testaceous-hyaline; legs entirely black, basitarsi slender, spurs testaceous; pubescence uniformly very short and thin, entirely pale, scopa yellowish-white; punctures rather fine but deep and distinct, quite close over most of head and on scutum anteriorly, becoming somewhat more widely separated on scutum posteriorly and on scutellum, well separated but hardly sparse on pleura, close and rather coarse on the more basal, abdominal terga, well separated medially but close laterally on terga 2-4, much finer and quite close on 5 and 6, apical margins not appreciably depressed and only very narrowly impunctate and somewhat yellowish; abdominal sterna quite coarsely and closely punctate beneath the scopal hairs, apical margins yellowish-hyaline.

MALE—Length 6-7 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other and to margin of vertex; median length of clypeus somewhat greater than half the maximum width, somewhat thickened apically, margin above this gently bowed; labrum only slightly longer than broad, apical margin not protuberant; mandibles slender but rather short, bi-dentate; cheeks subequal to eyes in width; wings subhyaline basally, becoming lightly infuscated apically, stigma piceous, veins more brownish-testaceous to piceous; tegulae smooth and shining, testaceous-hyaline; legs entirely black, spurs brownish-testaceous; apex of abdomen curved ventrally, tergum 7 triangularly emarginate medially between a pair of triangular projections, lateral margins obtusely angulate; sterna 1-4 exposed, black, surface shining between rather coarse but shallow punctures, 2 and 3 somewhat swollen across center, apical margins depressed, yellowish-hyaline, 4 with a broadly V-shaped thickening beyond which the margin is testaceous-hyaline, 5-8 retracted, 5 transverse, apical margin broadly yellowish-hyaline and slightly incurved, 6 broadly outcurved, the margin more narrowly yellowish-hyaline, 7 and 8 retracted, as shown (fig. 16); genital armature as shown.

DISTRIBUTION — Illinois and Michigan to Connecticut, south to Georgia, March to July.

FLOWER RECORDS — *Ilex, Philadelphus* and *Rubus*. Robertson (1929) records this species on the following additional genera: *Capsella, Crataegus, Ellisia, Geranium* and *Hydrophyllum*.

Ashmeadiella Cockerell

(Fig. 1)

Ashmeadiella Cockerell, 1897. Ent. News 8, p. 197. Type: *Heriades opuntiae* Cockerell. Orig. desig.

Titusella Cockerell, 1906. Amer. Mus. Nat. Hist. Bul. 22, p. 445. Type: *Titusella pronitens* Cockerell. Monob.

Ashmeadiella Michener, 1936. Amer. Mus. Novitates 875, pp. 1-16.

Ashmeadiella subg. *Arogochila* Michener, 1939. Amer. Midland Nat. 22, p. 58. Type: *Ashmeadiella timberlakei* Michener. Orig. desig.

Only two species of *Ashmeadiella* have been recorded in the Eastern United States, but it is represented in the west by nearly 50 species, in 6 subgenera.

The basal abdominal tergum is concave anteriorly but the margin is not carinate; the posterior face of the propodeum is perpendicular, its dorsal margin more sloping, narrowly pitted, with the metanotum posterior to the rounded scutellum. The axillae are very small, not at all protuberant; the notaulices of the scutum are linear; the pleura have an anterior, relatively smooth face which is demarked from the lateral surface by a low carina; and the tubercles are small, with a low, inconspicuous carina. In the front wings both recurrent veins are received well within the base and apex

of the 2nd submarginal cell, and the stigma is large. Arolia are present; the maxillary palpi are 4-segmented; and the abdominal terga have conspicuous, entire, apical, pale fasciae. In the males, tergum 6 is conspicuously quadri-dentate, tergum 7 very short, transverse, largely hidden; and sterna 5-8 are retracted and more or less markedly modified.

KEY TO SPECIES

Males and *Females*

1. Lateral ocelli much nearer to eyes than to edge of vertex, the vertex and cheeks broad ..... *bucconis* Say
   Lateral ocelli subequally distant from eyes and edge of vertex, the vertex and cheeks narrow ..... *floridana* Robertson (p. 55)

Ashmeadiella (Ashmeadiella) bucconis bucconis (Say)

(Fig. 17)

Osmia bucconis Say, 1837. Boston Jour. Nat. Hist. 1, p. 400. ♀ ♂.

Megachile osmioides Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 267. ♀ ♂.

Ahsmeadiella bucconis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

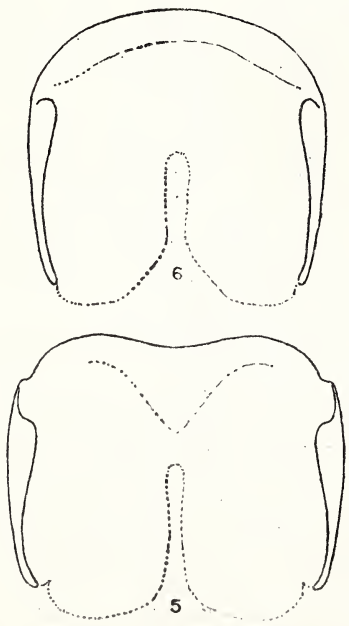


Figure 17
Sterna 5 and 6 in males of *Ashmeadiella bucconis*.

FEMALE—Length 8-9 mm.; entirely black; face much longer than distance between eyes; eyes subparallel; space between lateral ocelli and margin of vertex about twice that between ocelli and eyes, the inter-ocellar space shorter; clypeus very slightly convex, its breadth fully twice the median length, apical margin somewhat produced medially, this area nearly straight; labrum broadly rounded apically, basal area slightly concave, median length slightly greater than basal width; mandibles somewhat broadened apically, distinctly tri-dentate; cheeks slightly broader than eyes; wings subhyaline, veins and stigma piceous; tegulae dark, smooth and shining; legs entirely dark, hind coxae somewhat swollen, and hind femora somewhat swollen medially; front spurs yellowish, mid and hind spurs piceous to black; pubescence entirely pale, very short and thin, somewhat more copious and elongate between antennae and along lower inner orbits, the pleura and propodeum margined with lines of denser and more elongate pubescence, posterior face of propodeum and scutellum posteriorly with rather elongate but sparse, whitish hairs; terga 1-4 with narrow, white, apical fasciae, discal pubescence hardly evident, but becoming more definite on 5 and 6, 6 with a quite dense, apical, more yellowish fringe, scopa yellowish, quite dense; punctures coarse, deep and distinct over most of body, close on face below ocelli, cheeks, and on thorax laterally, rather sparse on vertex posterior to ocelli, very coarse and quite close on scutum and scutellum; abdominal terga shining between deep and distinct punctures, these well separated and somewhat finer on the more basal terga medially, becoming somewhat coarser laterally, uniformly rather coarse and close on tergum 5, crowded on 6, sterna with coarse, densely crowded punctures beneath the scopal hairs.

MALE—Length 7 mm.; entirely black; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli sub-equally distant from eyes and each other, widely removed from margin of vertex; median length of clypeus about half the breadth, slightly convex, apical margin nearly straight; labrum little if any longer than basal width, rounded apically; mandibles bi-dentate; cheeks slightly narrower than eyes; wings subhyaline, veins and stigma brownish; tegulae brownish-hyaline, smooth and shining; legs entirely dark, hind coxae somewhat swollen, hind femora only slightly so, front spurs pale yellowish, middle pair more testaceous, hind spurs brownish-testaceous; tergum 6 conspicuously quadri-dentate, median teeth narrowly rounded or subtruncate apically, lateral teeth triangularly acute;

tergum 7 very short, transverse, apical margin nearly straight; sterna 1-4 exposed, black, 5 and 6 as shown (fig. 17); genital armature and sterna 7 and 8 similar to *floridana* (fig. 18); pubescence entirely pale, rather loose and thin in general, but quite copious and elongate around antennae and lower part of face, on cheeks below, pronotum laterally, scutellum posteriorly, along each margin of mesopleura, and along lateral margins of posterior face of propodeum; terga 1-4 with dense, white, apical fasciae, these somewhat narrower medially, becoming more dense and conspicuous laterally, 5 not definitely fasciate, discal pubescence very short, thin and inconspicuous, barely visible, entirely pale; sterna 2 and 3 fringed apically with long, whitish pubescence; punctures coarse, deep and distinct, quite close in general, but somewhat more widely separated on vertex medially, on scutum near median part of disc posteriorly, and on scutellum, with an area on lower part of pleura where they are more definitely separated; tergum 1 closely and coarsely punctate, 2 and 3 with somewhat finer and more widely separated punctures medially, these becoming quite coarse, deep and close laterally, 4-6 closely, deeply and rather coarsely punctate throughout; exposed sterna closely, deeply and coarsely punctate.

DISTRIBUTION — This species is chiefly western, but has been collected in Wisconsin, Illinois and Georgia, in May and August.

FLOWER RECORD — *Helianthus*. Robertson (1929) records *bucconis* on the following genera: *Brauneria, Coreopsis, Solidago, Verbena* and *Verbesina.*

Another subspecies, *denticulata* Cresson, is western in distribution.

Ashmeadiella (Ashmeadiella) floridana (Robertson)

(Fig. 18)

Heriades floridanus Robertson, 1897. Acad. Sci. St. Louis Trans. 7, p. 348. ♀.

FEMALE—Length 7-8 mm.; entirely black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and each other, slightly more removed from margin of vertex; clypeus slightly convex, about a third broader than median length, apical margin outcurved on each side, median third slightly incurved; labrum nearly as broad as long, broadly rounded apically; mandibles somewhat broadened apically, distinctly 3-dentate, median tooth very slightly nearer apex than to inner angle; cheeks somewhat narrower than eyes; wings subhyaline, veins and stigma brownish-testaceous; tegulae fuscous, smooth and shining; legs entirely black, spurs on front legs yellowish-hyaline, middle pair more testaceous, hind spurs fuscous; pubescence quite short, entirely pale, rather dense around antennae and along inner orbits, cheeks below, anterior and posterior margins of mesopleura, and lateral areas of propodeum, with a fringe around posterior margin of the scutellum; abdominal terga 1-4 with rather narrow, whitish, apical fasciae, these somewhat narrowed medially, becoming very dense and somewhat broader laterally, discal pubescence very short, thin and entirely pale; tergum 5 fringed with a single row of whitish hairs; scopa entirely pale; punctures quite coarse, close and deep, but slightly separated on vertex, closer on face below, rather fine and densely crowded on supraclypeal area, the clypeus more rugoso-punctate, coarsely so above, becoming very finely so toward apical margin; punctures only slightly separated on scutum and scutellum, surface shining, almost crowded on pleura, very fine and close on lateral surfaces of propodeum, the posterior face polished and largely impunctate; punctures rather fine and well separated on the more basal abdominal terga medially, becoming coarse and close laterally, and quite coarse and uniformly close on 4 and 5, 6 coarsely rugoso-punctate.

MALE—Length 6-7 mm.; entirely black; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and each other,

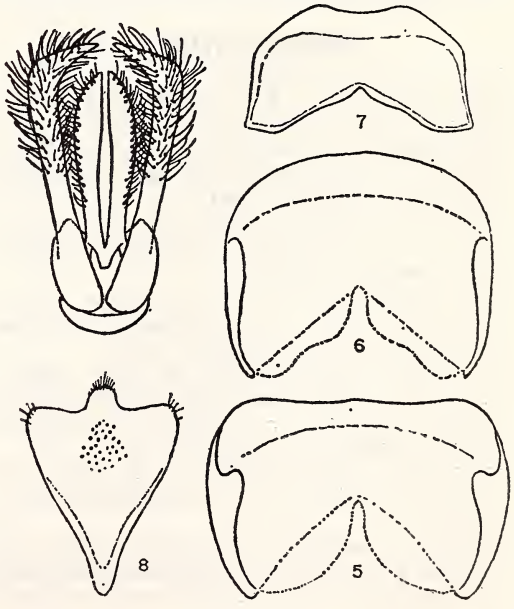


Figure 18
Genital armature and sterna 5-8 in males of *Ashmeadiella floridana*.

slightly more distant from margin of vertex; clypeus slightly convex, apical margin very slightly outcurved, with a slight, median emargination; basal width of labrum subequal to its median length, broadly rounded apically; mandibles rather slender, bi-dentate; wings hyaline, veins and stigma brownish-testaceous; tegulae dark, smooth and shining; legs entirely black, basitarsi slender and rather short, front spurs yellowish, middle spurs brownish-testaceous, hind spurs blackish or piceous; tergum 6 conspicuously quadri-dentate apically, teeth about equally spaced, middle pair rather broadly truncate, lateral teeth triangularly acute; sterna 1-4 exposed, black, 5-8 retracted, form as shown (fig. 18); genital armature as shown; pubescence entirely pale, rather short, copious around and below antennae, on cheeks below and on anterior and posterior margins of mesopleura, with a long dense fringe on scutellum posteriorly; terga 1-4 with narrow, white, apical fasciae, these much more dense toward sides on the more basal terga; punctures rather coarse, close and deep in general, somewhat more distinctly separated on vertex and around ocelli, on cheeks above and on scutum medially, rather fine on the more basal terga medially but becoming close and somewhat coarser laterally, entirely close and coarse on terga 5 and 6.

DISTRIBUTION — North Carolina to Florida, April to July.

FLOWER RECORD — *Lupinus.*

Hoplitis Klug

(Fig. 1)

Hoplitis Klug, 1807. Mag. Insectenk. 6, p. 225. Type: *Apis adunca* Panzer. Monob.

Osmia subg. *Ctenosmia* Thomson, 1872. Hym. Scand. 2, p. 233. Type: *Apis adunca* Panzer. Desig. by Michener, 1941.

Andronicus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 384. Type: *Andronicus cylindricus* Cresson, Monob.

Alcidamea Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 385. Type: *Alcidamea producta* Cresson. Desig. by Michener, 1941.

Monumetha Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 387. Type: (*Monumetha argentifrons* Cresson) = *Chelostoma albifrons* Kirby. Desig. by Titus, 1904.

Robertsonella Titus, 1904. N. Y. Ent. Soc. Jour. 12, p. 22. Type: *Robertsonella gleasoni* Titus.

Hoplitella Cockerell, 1910. Canad. Ent. 42, p. 169. Preocc. Type: (*Hoplitella pentamera* Cockerell) = *Ashmeadiella howardi* Cockerell. Monob.

Hoplitina Cockerell, 1913. Canad. Ent. 45, p. 34. (new name)

Formicapis Sladen, 1916. Canad. Ent. 48, p. 271. Type: *Formicapis clypeata* Sladen. Monob.

Autochelostoma Sladen, 1916. Canad. Ent. 48, p. 270. Type: (*Autochelostoma canadensis* Sladen) = *Alcadamea producta* Cresson. Monob.

Chlorosmia Sladen, 1916. Canad. Ent. 48. p. 270. Type: *Osmia fulgida* Cresson. Monob.

Chlorosmia Michener, 1936. Amer. Mus. Novitates 875, p. 29, (key)

Formicapis Michener, 1938. Ent. News 49, p. 129.

Robertsonella Michener, 1938. Ent. News 49, p. 130.

Hoplitis Michener, 1947. Amer. Mus. Nat. Hist. Bul. 89, pp. 261-317. (revision)

Hoplitis Hurd and Michener, 1955. Calif. Ins. Surv. 3, pp. 44-94. (Calif. spp.)

Hoplitis is a genus of rather small, slender and parallel-sided species of bees, usually entirely black in color, although a few metallic species are found in the West. Characters common to both sexes are as follows: Basal abdominal tergum sulcate anteriorly; posterior face of propodeum sloping, without a dorsal pitted area, the metanotum partially forming the dorsal surface of the thorax posterior to the rounded scutellum; axillae very small and inconspicuous, not at all protuberant; notaulices of scutum linear; pleura and tubercles not carinate; recurrent veins usually received well within base and apex of 2nd submarginal cell, the stigma large; arolia present; maxillary palpi usually 5-segmented. In the females the mandibles are either tri- or quadri-dentate, but are bi-dentate in all males. The abdominal sterna in the males are variously modified, 6-8 usually retracted.

KEY TO SPECIES

Females

1. Clypeus modified, with a conspicuous, median, erect, apical tubercle ..... *(Formicapis) clypeata* Sladen (p. 57)
   Clypeus little if any modified, apical margin relatively straight 2
2. Mandibles 4-dentate 3
   Mandibles 3-dentate 4
3. Pleura, legs and abdominal terga 4-6 black pubescent ..... *(Monumetha) albifrons* Kirby (p. 58)
   Abdominal terga, legs and pleura white pubescent ..... *(Andronicus) cylindrica* Cresson (p. 59)

4.(2). Clypeus very finely and densely ru-

gose, without distinct punctures *(Robertsonella)* 5
Clypeus with distinct, though possibly closely crowded punctures *(Alcidamea)* 7

5. Punctures of abdominal terga 1 and 2 usually quite coarse and close .... *gleasoni* Titus (p. 65)
Terga 1 and 2 very sparsely and minutely punctate 6

6. Scutum shining, punctures well separated between notaulices and tegulae .... *micheneri* new species (p. 64)
Scutum rather dull, punctures close, almost crowded, between notaulices and tegulae ..... *simplex* Cresson (p. 66)

7(4). Punctures of clypeus densely crowded, usually with a slightly elevated, median ridge ..... *truncata* Cresson (p. 63)
Punctures of clypeus more distinctly separated, with no median ridge 8

8. Puncturation fine, especially on basal abdominal tergum which is polished and rather sparsely punctate .... *producta* Cresson (p. 62)
Puncturation coarser; basal tergum with rather coarse and close punctures .... *pilosifrons* Cresson (p. 61)

Males

1. Abdominal tergum 7 undulate apically, having a median and a pair of lateral, shallow emarginations .... *(Formicapis) clypeata* Sladen
Tergum 7 either rounded, truncate or acute apically 2

2. Tergum 7 narrow, medially acute, its median length fully equal to basal width *(Alcidamea)* 3
Tergum 7 broadly rounded or truncate apically, usually quite short 4

3. Protuberance of second sternum conical, acute ..... *producta* Cresson (p. 62)
Protuberance of second sternum transverse, rounded, less conical .... *pilosifrons* Cresson (p. 61)

4(2). Small (8 mm. or less); antennae filiform, median segments narrow and elongate *(Robertsonella)* 5
Larger (9 mm. or more); antennae modified, median segments not much longer than broad 7

5. Clypeal pubescence very short, dense and appressed, punctures beneath very fine; mandibular fringe long and dense; sternum 3 with a shallow, median emargination which is fringed with short hairs .... *gleasoni* Titus (p. 65)
Clypeal pubescence elongate, more or less erect; mandibular fringe short and thin; sternum 3 variable 6

6. Apical margin of sternum 3 nearly straight, emargination very obscure; small (6 mm.) .... *simplex* Cresson (p. 66)
Sternum 3 with a narrow and very deep median emargination which is occupied by a dense fringe of pale hairs; larger (8 mm.) .... *micheneri* new species (p. 64)

7(4). Segments 3-5 of flagellum very short and broadly dilated, much broader than the other segments ..... *(Andronicus) cylindrica* Cresson (p. 59)
Segments 3-5 of flagellum little if any broader than long, not noticeably dilated 8

8. Subapical segments of flagellum much shorter, broader than long; clypeus densely pubescent ..... *(Alcidamea) truncata* Cresson (p. 63)
Subapical antennal segments not noticeably shortened; clypeus largely bare, or with appressed pale tomentum ..... *(Monumetha) albifrons* Kirby (p. 58)

Hoplitis (Formicapis) clypeata (Sladen)

(Figs. 19 & 20)

Formicapis clypeata Sladen, 1916. Canad. Ent. 48, p. 271. ♀.
Hoplitis (Formicapis) clypeata Hurd and Michener, 1955. Calif. Ins. Surv. 3, p. 54.

FEMALE—Length 7 mm.; entirely black; length of face about equal to distance between eyes; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex, much nearer to each other; clypeus very short

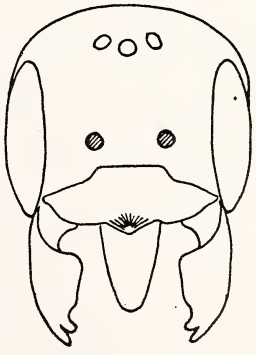


Figure 19
Facial view of head in female of *Hoplitis clypeata*.

and broad, median length hardly more than half the breadth, with a median, apical, triangularly acute and upturned tubercle, slightly emarginate on each side of this (fig. 19); mandibles robust, broadly expanded apically, with a subapical inner tooth which is widely removed from inner, rounded angle; cheeks nearly twice as broad as eyes; wings very faintly infuscated, stigma brownish, veins more brownish-testaceous; 1st recurrent vein interstitial with 1st transverse cubitus; tegulae piceous, smooth and shining; legs entirely black, spurs pale yellow; pubescence entirely pale, elongate but rather thin over most of head and thorax, rather copious on vertex and across face just above antennae, thin and elongate over most of thorax, entirely pale on legs; abdominal terga 1-4 with narrow, whitish, apical fasciae, this widely interrupted on 1, discal pubescence hardly evident but becoming more definite on 4 and 5, 6 with a quite dense covering of subappressed, whitish tomentum; scopa yellowish-white; punctures quite deep and distinct over most of head and thorax, quite close across upper part of face between antennae and ocelli, but more sparse and fine below and on clypeus, rather sparse on cheeks below but quite close above and on vertex, rather well separated but not sparse on the shining scutum, somewhat closer on scutellum, those of pleura about as on scutum; posterior face of propodeum dull and rather densely tessellate, punctures hardly evident; abdominal terga shining, punctures minute and rather widely separated, becoming somewhat closer on the more apical segments, sterna closely and finely punctate beneath the scopal hairs.

MALE—Length 8 mm.; entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below; antennal scape rather short, only slightly broader than flagellum, pedicel entirely exposed, segments of flagellum of uniform width, only slightly longer than broad; lateral ocelli considerably nearer each other than to eyes, subequally distant from margin of vertex and each other; clypeus quite flat, rather densely pubescent, apical margin considerably produced but relatively straight, finely crenulate; mandibles bi-dentate; cheeks broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apex, veins and stigma brownish-piceous, 1st recurrent vein entering 1st submarginal cell; tegulae shining, brownish-piceous, punctures exceedingly minute, hardly evident; legs entirely black, spurs yellow; apical half of abdominal tergum 7 exposed, the margin undulate, with a median and a pair of lateral, shallow emarginations (fig. 20); sternum 1 truncate apically, 2 quite

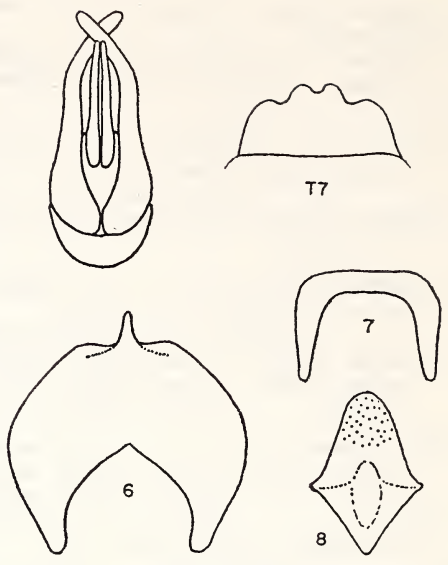


Figure 20
Genital armature, sterna 6-8, and tergum 7 in males of *Hoplitis clypeata*.

expansive, broadly rounded apically, 3-5 unmodified, largely exposed, 6-8 retracted, form as shown (fig. 20); genital armature as shown; pubescence entirely pale, rather elongate and copious over most of head and thorax; punctures quite deep and distinct over most of head and thorax, close in general, becoming rather coarse on vertex and dorsum of thorax, fine and close on cheeks, finer and densely crowded on clypeus, close but rather shallow on pleura, indistinct on propodeum; abdominal terga somewhat shining, punctures minute and well separated medially, becoming close laterally.

DISTRIBUTION — California to Alaska, east to Quebec.

Although this has not been recorded in any of the eastern states, its occurrence in Quebec suggests the possibility that it will be found in some of the bordering states.

Hoplitis (Monumetha) albifrons albifrons (Kirby)

(Figs. 23 & 24)

Chelostoma albifrons Kirby, 1837. *In* Richardson, Fauna Bor.-Amer., 4, p. 270. ♂.

Monumetha borealis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 388. ♀

Monumetha obsoleta Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 388. ♂.

Megachile oblonga Provancher, 1882. Nat. Canad. 13, p. 230. ♀.

Hoplitis (Monumetha) albifrons albifrons Michener, 1947. Evolution 1, p. 172.

FEMALE—Length 11-13 mm.; entirely black; face much longer than distance between eyes; eyes subparallel; lateral ocelli nearer each other than to eyes, and much nearer eyes than to margin of vertex; clypeus broadly convex, apical margin quite strongly outcurved, but median third or fourth narrowly produced and very slightly incurved, the margin of this area polished and impunctate; mandibles broad apically, 4-dentate; width of cheeks about twice that of eyes; wings subhyaline basally, becoming lightly infuscated apically, veins and stigma piceous; tegulae brownish-piceous, smooth and shining; legs entirely black, front spurs hyaline in part, mid and hind spurs black; pubescence rather thin but somewhat elongate, rather copious and pale around antennae, becoming somewhat blackish on vertex and clypeus, cheeks below, on pleura and over most of legs; pubescence largely pale on scutum, scutellum and posterior face of propodeum; abdominal tergum 1 largely pale pubescent, 2 pale pubescent in part, 3-6 largely black pubescent, 1 and 2 subfasciate apically toward sides; scopa entirely blackish; punctures fine and rather close over most of head and thorax, becoming somewhat more widely separated on vertex medially and on scutum posteriorly; abdominal terga shining, punctures minute and widely separated medially, interspaces being many times diameter of punctures, these becoming much closer toward the extreme lateral margins, tergum 5 more closely punctate, 6 with fine, crowded punctures, with a narrow, rounded, apical lip; sternum 6 triangularly pointed medially.

MALE—Length 9 mm.; entirely black; face nearly twice as long as distance between eyes; eyes subparallel; lateral ocelli slightly nearer eyes than to each other, slightly nearer each other than to margin of vertex; median segments of flagellum about as broad as long, apical segment more elongate, tapering apically (fig. 23); clypeus only slightly convex, broadly produced apically, nearly as long as the greatest breadth, apical margin nearly straight; mandibles bi-dentate; cheeks somewhat broader than eyes; wings hyaline at extreme base, becoming lightly infuscated apically, veins and stigma piceous; tegulae piceous, smooth and shining, with scattered, minute puncture evident; legs entirely black, anterior spurs more yellowish-hyaline, mid and hind spurs piceous or black; tergum 7 much broader than long, rather broadly rounded apically, with a submedian, depressed area; sterna 1-5 exposed, smooth and shining in large part, 1 and 2 each with a median, apical, spine-like projection, with only a few scattered punctures, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence of head and thorax largely pale, rather thin but somewhat elongate, subappressed between antennae and eyes, clypeus with dense, appressed tomentum; legs with short, black pubescence except for the pale posterior fringe on front tarsi; abdomen not fasciate, discal pubescence of the terga extremely short, thin and inconspicuous, tergum 6 sometimes obscurely fasciate apically.

DISTRIBUTION—British Columbia to Maine and Nova Scotia, north to Hudson Bay and Alaska, May to August.

FLOWER RECORD — *Phacelia.*

There are two additional forms of *albifrons* occurring in the West, *argentifrons* (Cresson) and *maura* (Cresson)

Hoplitis (Andronicus) cylindrica (Cresson)

(Figs. 21-23)

Andronicus cylindricus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 384. ♂.

Osmia spoliata Provancher, 1888. Addit. Corr. Faune Ent. Canada Hym., p. 327. ♀.

Hoplitis monardae Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 14, p. 363. ♀.

Hoplitis hicksi Cockerell, 1932. Brooklyn Ent. Soc. Bul. 27, p. 203. ♀.

Hoplitis cylindricus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records).

FEMALE—Length 10-12 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly converging below; lateral ocelli very slightly nearer each other than to eyes, much more widely removed from margin of vertex; clypeus broadly and slightly convex, apical margin considerably produced, median half nearly straight, with a rather narrow, shining, impunctate area; mandibles broadened apically, quadri-dentate, but third tooth often very low and inconspicuous (fig. 22); cheeks very much broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apex, veins and stigma piceous; tegulae black, shining, with scattered, deep and quite distinct but rather fine punctures; legs entirely black, front spurs testaceous, mid and hind spurs black; pubescence entirely pale, rather thin but quite copious around antennae and over lower portions of face, on cheeks and on thorax laterally; abdominal terga 1-4 and sometimes 5 with white, apical fasciae, these more or less interrupted on the more basal terga, discal pubescence very short and thin, entirely pale, becoming more evident on the more apical terga quite dense on tergum 6;

scopa entirely whitish; punctures deep and distinct, but rather fine and close in general, somewhat more distinctly separated on vertex medially, rather sparse and irregular in center of scutum toward posterior margin; scutum and scutellum shining, the pleura and propodeum dull and tessellate, pleura very closely punctate, the propodeum velvety, its posterior face completely devoid of punctures, dorsal area with a few faint, short striations just beneath metanotum; abdominal terga somewhat shining, but punctures quite close in general, slightly separated medially on terga 1-4, becoming almost crowded laterally and on terga 5 and 6, apical margins of the terga slightly depressed, that on 1 narrowly impunctate, but with very minute and close punctures on the others.

MALE—Length 9-12 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; antennal scape quite broadly dilated apically, partially enclosing pedicel, segments 3-5 of flagellum dilated, considerably broader than long, segments 8-11 elongated and quite narrow (fig. 23); lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus very slightly convex, densely long pubescent, apical margin considerably produced but relatively straight, with a narrow, shining, impunctate area; mandibles bidentate; cheeks only slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apex, veins and stigma brownish-piceous; tegulae shining, brownish-piceous, with scattered, fine punctures; legs entirely black, front spurs pale testaceous, mid and hind spurs brownish-piceous, middle pair very much reduced; abdominal tergum 7 fully exposed, broadly rounded apically, somewhat impressed just before the margin, median portion thickened, its edge shining and impunctate; sternum 1 triangularly pointed apically, 2 quite expansive, with a subapical, semicircular ridge beyond which the margin is testaceous-hyaline and with a median, broad, whitish fringe; sternum 3 quite expansive, apical margin produced to cover median area of 4, lateral areas of 4 exposed, the margin slightly incurved; apical margin of sternum 5 straight, with a median, apically directed fringe of long hairs and a subapical broader fringe of ventrally directed hairs; sterna 6-8 retracted, form as shown (fig. 21); genital armature as shown; pubescence entirely pale, rather elongate and copious over most of head and thorax, but becoming very thin on propodeum, both laterally and posteriorly, quite elongate on front and mid femora, forming rather copious, posteriorly directed fringes; abdominal terga 1-4 white fasciate apically, at least in part, the fasciae more or less widely interrupted on terga 1-2, entire on 3 and 4, and sometimes evident on 5, discal pubescence rather long and copious on 1 and 2, short and inconspicuous but evident on remaining terga; punctures fine and close over most of head and thorax, being more distinct on shining surfaces of vertex and dorsum of thorax, pleura and propodeum dull and densely tessellate, punctures extremely close, minute on pleura, very shallow and obscure on propodeum; abdominal terga somewhat shining, punctures slightly separated medially on terga 1-7, becoming closely crowded laterally, tergum 7 shining and with an area of rather sparse, irregular punctures medially.

DISTRIBUTION — British Columbia to Quebec and Maine, South to Texas and Florida, April to August.

FLOWER RECORDS — *Rubus, Senecio* and *Specularia.* Robertson (1929) records this species on *Amorpha, Blephilia, Celastrus, Dianthera, Hydrophyllum, Labelia, Petalostemum, Trifolium, Verbena* and *Veronica.*

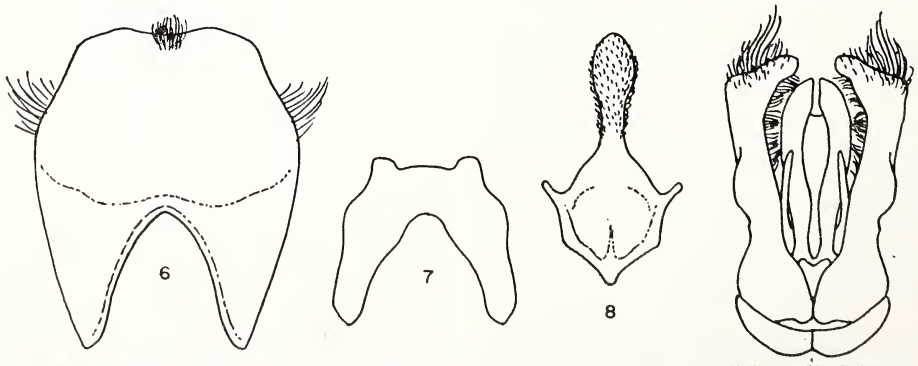


Figure 21—Genital armature and sterna 6-8 in male of *Hoplitis cylindrica.*

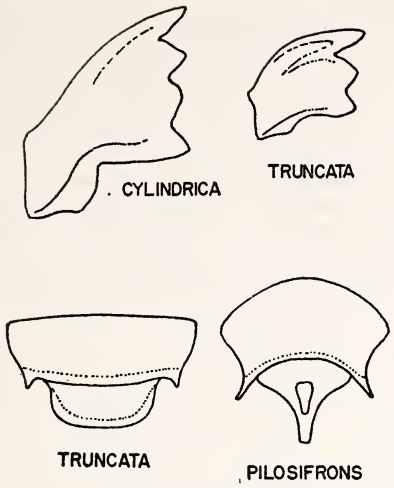


Figure 22
Mandibles in females and tergum 7 in males of *Hoplitis*.

Hoplitis (Alcidamea) pilosifrons (Cresson)

(Figs. 22-24)

Alcidamea pilosifrons Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 386. ♂.

Hoplitis graceae Cockerell, 1923. Ann. Mag. Nat. Hist. (9) 11, p. 263. ♀.

Alcidamea simplex Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Alcidamea mucronata Cockerell, 1934. Brooklyn Ent. Soc. Bul. 29, p. 18. ♂.

Hoplitis pilosifrons Michener, 1955. Kans. Ent. Soc. Jour. 28, p. 81. (biology)

FEMALE—Length 6.5-8.5 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus broadly convex, apical margin considerably produced, median portion slightly incurved, margin narrowly shining, without definite punctures; labrum rather flat, median length subequal to its basal width, broadly, rounded apically; mandibles distinctly 3-dentate, not much broadened apically, middle tooth approximate to apical tooth; cheeks slightly broader than eyes; wings faintly infuscated, somewhat more deeply so along outer margin, veins and stigma brownish-piceous; tegulae shining, black, with scattered minute punctures; legs entirely black, front spurs testaceous, mid and hind spurs piceous; pubescence entirely pale, rather short and thin in general, somewhat more elongate around antennae, on cheeks below, pleura, propodeum, and on dorsum of thorax anteriorly and posteriorly; abdominal terga 1-4 with white, apical fasciae, these rather widely interrupted on 1 and 2, entire on 3 and 4, tergum 5 with only an inconspicuous fringe of fine, pale hairs, discal pubescence extremely short and obscure, hardly evident except on the more apical terga; tergum 6 with a quite pronounced, apical rim, at right angles to the more vertical disc; ventral scopa yellowish-white; punctures rather coarse and deep, close in general, more distinctly separated on vertex toward each side, and over scutum and scutellum, fine and close on cheeks, crowded on pleura, propodeum dull and tessellate, punctures fine, shallow and rather indefinite; abdominal terga shining, punctures more definitely separated but still rather close on terga 1-5 medially, becoming quite coarse and close laterally, crowded on tergum 6.

MALE—Length 7-8.5 mm.; entirely black; face somewhat longer than distance between eyes above; eyes rather strongly convergent below; antennal scape robust but not dilated apically, apex excavated and enclosing pedicel; subapical segments of flagellum much broader than long, apical segment more elongate, tapering and slightly curved (fig. 23); lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, apical margin somewhat produced, the produced area very slightly incurved, angulate at each extreme side and narrowly shining and impunctate, surface usually obscured by dense, erect and rather elongate pubescence; labrum flattened, somewhat shining, length about equal to basal width; mandibles distinctly bi-dentate; cheeks subequal to eyes in width; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, brownish-piceous, with minute, scattered punctures; legs entirely black, spurs pale testaceous; tergum 7 quite broad at base but narrowly produced medially, almost spine-like, with a narrow and rather deep, median excavation (fig. 22); sterna 1-5 exposed, 2 with a conspicuous, erect, transverse protuberance, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence entirely pale, elongate and rather dense over most of head and thorax, extremely dense around antennae and over lower portions of face and on clypeus, cheeks below with a short but dense fringe, this becoming more elongate posteriorly; pubescence elongate over most of thorax but not hiding surface, terga 1-4 with white, apical fasciae, this widely interrupted on 1 and more or less so on 2, usually entire on 3 and 4, discal pubescence rather copious but short on 1, very short but evident on remaining terga; punctures deep

and distinct, quite close over most of head and thorax, being densely crowded on the more densely pubescent areas of face, more distinctly separated on the shining scutum and scutellum, very close on pleura, propodeum dull but rather smooth, punctures very shallow and indefinite; punctures on abdominal terga 1-4 rather fine and well separated medially, becoming closer and somewhat coarser at sides, uniformly quite coarse and close on 5 and 6, crowded across base of 7.

DISTRIBUTION—Alberta to Quebec and the New England States, south to Texas and Florida, April to August.

FLOWER RECORDS — *Barbarea, Geranium, Linaria, Melilotus, Oenothera, Pedicularis, Pentstemon, Potentilla, Rubus, Senecio, Specularia, Tephrosia, Trifolium* and *Vicia*. Robertson (1929) records this species (as *Alcidamea simplex*) on the following additional genera: *Amorpha, Blephilia, Cardamine, Chrysanthemum, Coreopsis, Desmodium, Dianthera, Erigeron, Gillenia, Heracleum, Houstonia, Hydrophyllum, Krigia, Lepachys, Lobelia, Lythrum, Malva, Nepeta, Oxalis, Petalostemum, Polymonium, Psoralea, Pycnanthemum, Radicula, Scutellaria, Stachys, Taenidia, Teucrium, Verbena, Veronica* and *Zizia*.

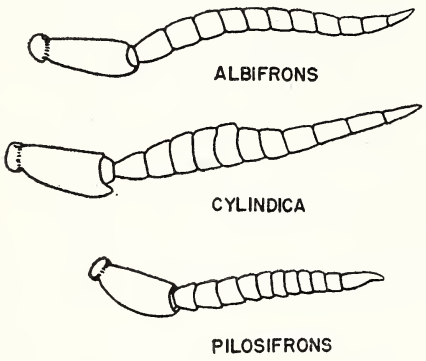


Figure 23
Antennae in males of *Hoplitis*.

Hoplitis (Alcidamea) producta producta (Cresson)

(Fig. 24)

Alcidamea producta Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 386. ♂.

Autochelostoma canadensis Sladen, 1916. Canad. Ent. 48, p. 270 "♂" = intersex

Alcidamea producta Rau, 1928. Psyche 35, p. 100. (biology)

Alcidamea helenae Cockerell, 1934. Amer. Mus. Novitates 732, p. 6. ♂.

FEMALE—Length 8 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, very slightly more distant from eyes; clypeus slightly convex, apical margin broadly produced, this area nearly straight and with a shining, impunctate margin; mandibles only slightly broadened apically, tri-dentate, median tooth subapical in position; cheeks considerably broader than eyes; wings very lightly infuscated, veins and stigma brownish-piceous; tegulae piceous, shining, with minute, scattered punctures; legs entirely black, front spurs testaceous-hyaline, mid and hind spurs piceous to black; pubescence entirely pale, rather short but copious over most of head and thorax, rather thin on vertex and on dorsum of thorax; abdominal terga 1-4 with quite dense, whitish, apical fasciae, these rather widely interrupted on 1 and 2, 5 not definitely fasciate, discal pubescence extremely short, hardly evident on the more basal terga, becoming more definite and conspicous on the more apical terga, 6 with a quite abrupt, apical lip, almost at right angles to the more basal portion of the disc; scopa whitish; punctures deep and distinct over most of head and thorax, quite close in general, but with evident intervening spaces on dorsum of thorax which is shining, very close but not crowded over most of face above, cheeks and pleura, quite coarse over most of clypeus above, but becoming finer and densely crowded toward apical margin; abdominal terga shining, basal tergum with very fine and well separated punctures medially, becoming fine and close laterally, those on 2 and 3 rather fine and well separated medially, coarser and closer on 4, those on 5 almost crowded, surface not so shining, and 6 with fine, densely crowded punctures throughout.

MALE—Length 6-7 mm.; entirely black; face only slightly longer than distance between eyes above; eyes slightly convergent below; antennal scape robust but not dilated apically, apex excavated and almost completely enclosing pedicel, the more apical flagellar segments much broader than long, apical segment elongate, tapering and slightly curved; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus slightly convex, apical margin only slightly produced, nearly straight, margin narrowly shining and impunctate; mandibles bi-dentate; cheeks subequal to eyes in width; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, piceous, with scattered, fine punctures; legs entirely black, front spurs pale testaceous, mid and hind spurs somewhat more brownish; abdomi-

nal tergum 7 broad at base, narrowly produced apically to a spine-like tip, with a narrow, sub-basal excavation; sterna 1-5 exposed, 2 produced below into a rather acute, robust prominance, 3 and 4 somewhat rounded apically, each with a subapical, slightly elevated ridge, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence entirely pale, rather long and copious over most of head and thorax, being very dense around antennae and on face below, quite long and copious on cheeks below and over most of pleura and propodeum, quite dense and elongate on front and mid femora posteriorly; abdominal terga 1-4 with narrow, white, apical fasciae, these widely interrupted medially on 1 and 2, usually entire on 3-5, 6 not fasciate, discal pubescence extremely short and thin on the more basal terga, becoming more evident on the more apical terga; punctures quite deep and distinct, close and rather fine over most of head and thorax, crowded beneath pubescence on face below antennae, more distinct but close on vertex and over most of dorsum of thorax, but slightly more widely separated on scutellum medially, distinctly but not widely separated on upper part of pleura, the propodeum rather dull and tessellate, punctures shallow and obscure but very fine and close; abdominal terga shining, punctures well separated medially but not sparse on 1-3, becoming almost crowded at extreme sides, rather coarse on 2-4, almost crowded on 5-7.

DISTRIBUTION — California to Quebec and Maine, south to Georgia and Texas, April to August.

FLOWER RECORDS — *Apocynum, Azalea, Baptisia, Barbarea, Chrysanthemum, Melilotus, Potentilla, Rubus, Salix* and *Trifolium.*

The occurrence of several subspecies in the West make this subspecific designation of *producta* necessary.

Hoplitis (Alcidamea) truncata truncata (Cresson)

(Figs. 22 & 24)

Alcidamea truncata Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 108. ♂.

Alcidamea truncata Robertson, 1929. Flowers and Insects, Lancaster Pa., Science Press. (flower records)

FEMALE—Length 8.5-9.5 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus slightly convex, apical margin somewhat produced, nearly straight and slightly impressed, a quite distinct, median, impunctate ridge extending from base to near the apex; mandibles distinctly 3-dentate, only slightly expanded apically, middle tooth nearer apex than to inner angle (fig. 22); cheeks very slightly broader than eyes; wings faintly infuscated, veins and stigma brownish-piceous; tegulae shining, blackish, with scattered, minute punctures; legs entirely black, front and mid spurs testaceous, hind spurs somewhat darker; pubescence entirely pale, quite short and thin in general but rather copious around antennae and down sides of face, cheeks below with a fringe of much elongated hairs that nearly meet beneath; pleura and propodeum with rather copious pubescence, that on legs short in general, somewhat elongated on front femora posteriorly; abdominal terga 1-5 with white, apical fasciae, these widely interrupted on 1 and 2, entire or subentire on 3-5, discal pubescence extremely short, hardly evident, becoming quite copious on 6 but not hiding surface; scopa entirely yellowish-white.

MALE—Length 8-8.5 mm.; entirely black; face slightly longer than distance between eyes above; eyes considerably converging below; antennal scape somewhat enlarged but not dilated apically, subapical segments of flagellum considerably broader than long, apical segment more elongate, slightly curved, tapering nearly to a point; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus slightly convex, densely pubescent, apical margin somewhat produced but nearly straight; mandibles distinctly bi-dentate; median length of labrum not much greater than basal width, basal half shining, slightly excavated, apical portion strongly convex, shining but with distinct punctures; cheeks subequal to eyes in width; wings very lightly infuscated, veins and stigma more brownish-piceous; tegulae shining, brownish-hyaline in part, with scattered, fine punctures; legs entirely dark, spurs pale testaceous; tergum 7 exposed, broad, apical margin rather broadly truncate (fig. 22); sterna 1-5 at least partially exposed, 1 slightly thickened toward apical margin but not at all produced, 2 broad and rather expansive, apical margin slightly outcurved, disc slightly swollen across median area, 3 and 4 with broad and rather shallow, incurved, or emarginate areas which are densely fringed, slightly swollen on each side, 6-8 retracted, form as shown (fig. 24); genital armature as shown; pubescence entirely pale, rather short in general, dense and copious around antennae and over lower half of face and clypeus, quite dense on cheeks below posteriorly, copious over pleura and around

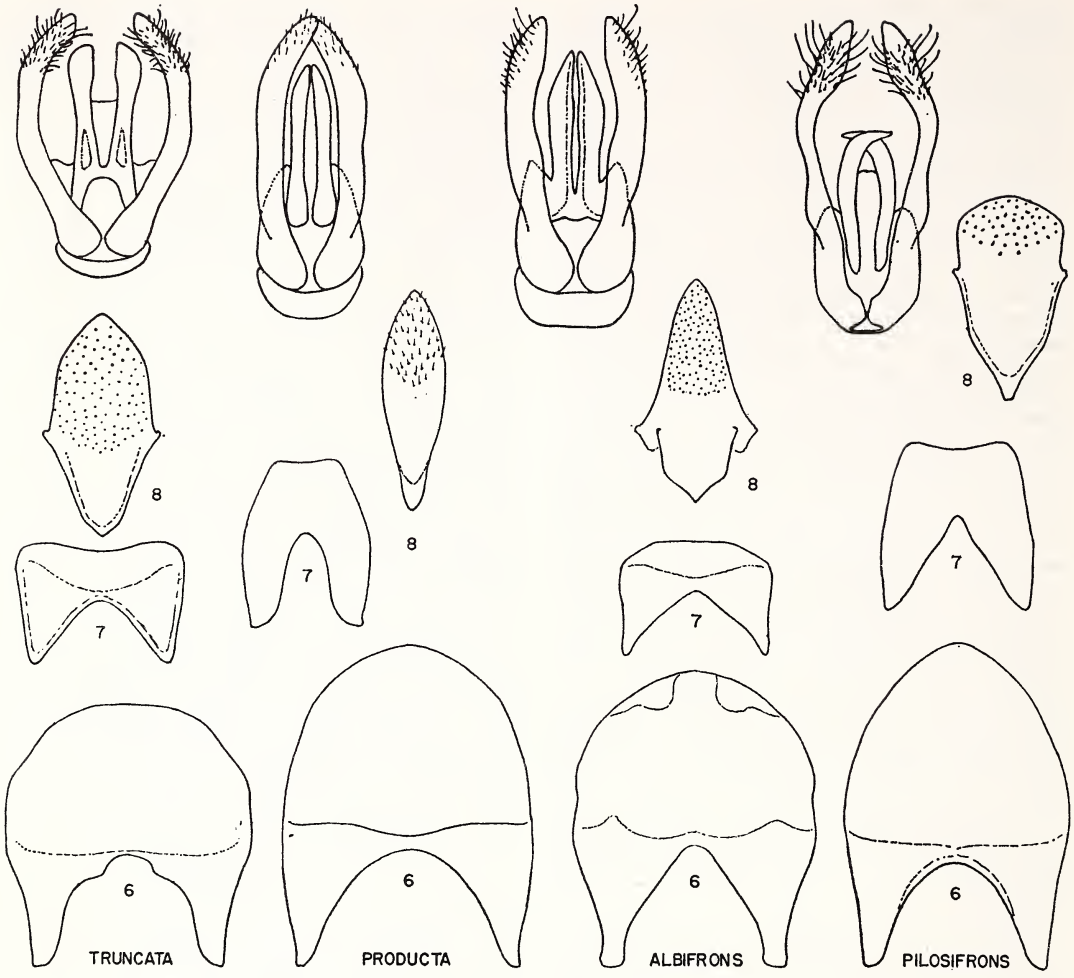


Figure 24—Genital armature and sterna 6-8 in males of *Hoplitis*.

wing bases, and quite dense on front femora posteriorly; terga 1-5 with white apical fasciae, these widely interrupted on 1 and 2, more or less entire on 3-5, discal pubescence very short and thin, but becoming somewhat more evident on the more apical terga; punctures fine and close in general, more distinctly separated on vertex and dorsum of thorax where surface is shining, densely crowded on cheeks, lower part of face and pleura; propodeum dull and tessellate, with very shallow and obscure but densely crowded punctures laterally, posterior surface somewhat more shining, abdominal terga more shining, punctures slightly separated medially on terga 1-4 becoming crowded laterally, quite uniformly close on 5 and 6, 7 rather coarsely, irregularly rugose or reticulate.

DISTRIBUTION—North Dakota to Quebec and Maine, south to Florida, March (in Florida) to July.

FLOWER RECORDS—*Baptisia, Berlandiera, Ceanothus, Erigeron, Ilex, Melilotus, Oenothera, Pentstemon, Rubus, Trifolium, Vaccinium* and *Vicia*. Robertson (1929) records it on *Convolvulus* and *Gillenia*.

Another form of *truncata, mescalerium* Cockerell, occurs in Colorado and New Mexico.

Hoplitis (Robertsonella) micheneri new species

(Fig. 25)

FEMALE—Length 7-8 mm.; entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below;

lateral ocelli slightly nearer each other than to eyes, still nearer margin of vertex; clypeus very slightly convex, apical margin somewhat produced, practically straight, mandibles only slightly broadened apically, distinctly tridentate, median tooth only slightly nearer apex than to inner angle; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, stigma brownish-piceous, veins more brownish-testaceous; tegulae shining, piceous, with punctures hardly evident; legs entirely black, spurs pale yellow; pubescence entirely pale, rather short and thin, but quite copious around antennae, on face below, and over much of thorax, the dorsal pubescence elongate but very thin; abdominal terga 1-4 with narrow, whitish, apical fasciae, these widely interrupted medially on 1 and 2, usually entire on 3 and 4, 5 only sub-fasciate, discal pubescence exceedingly short and inconspicuous, hardly visible on the more basal terga, but becoming quite dense and subappressed on tergum 6, apical margin on 6 very slightly reflexed and shelf-like; scopa entirely yellowish-white; punctures quite deep and distinct, rather coarse and close in general, very close and somewhat finer on most of face, including vertex, becoming densely crowded on clypeus, close and fine on cheeks, but lower surface shining and impunctate, the two areas separated by a row of long, curled, whitish hairs directed toward the hypostome; scutum and scutellum shining between deep and distinct punctures, these finer and rather sparse in center of scutum, otherwise quite close, almost crowded on pleura; propodeum dull and tessellate, punctures very shallow and indefinite; abdominal terga shining, punctures minute and sparse on terga 1 and 2 medially, becoming close at extreme sides, somewhat coarser and closer on 3 and 4, uniformly fine and close on 5 and 6.

MALE—Length 6-8 mm.; entirely black; face considerably longer than distance between eyes above; eyes slightly convergent below; antennal scape slender and rather short, not much if any exceeding diameter of flagellum, pedicel completely exposed, flagellar segments slender and simple, considerably longer than broad; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, apical margin slightly produced, nearly straight, disc covered with relatively elongate, erect, whitish pubescence; labrum shining, rather flat and unmodified, median length somewhat less than basal width; mandibles bi-dentate; cheeks subequal in width to eyes; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, piceous to black, with minute, scattered punctures; legs entirely black, spurs pale yellow; tergum 7 exposed apically, margin rather broadly rounded, with a slight, subapical impression; sterna 1-5 exposed, apical margin of 2 broadly outcurved, with a low but distinct, subapical ridge, 2 with a quite deep, median emargination which is conspicuously fringed, 4 nearly straight apically, 6-8 retracted, form as shown (fig. 25); genital armature as shown; pubescence entirely pale, rather thin in general, somewhat more copious over head and thorax, rather dense on lower half of face and on cheeks below; abdominal terga 1-5 white fasciate apically, these interrupted medially, but dense at sides; punctures rather fine but deep and distinct over most of head and thorax, densely crowded over most of head, but lower surface of cheeks shining and more minutely punctate and more densely pubescent; scutum and scutellum shining, punctures slightly separated in center of discs, otherwise rather close, quite close over most of pleura, becoming rather sparse on a limited area just beneath wing base; propodeum dull and tessellate, punctures indistinct; abdominal terga 1-5 shining, punctures minute and quite sparse medially, becoming somewhat closer on the more apical terga, rather close at sides, even on basal tergum; tergum 6 rather closely but irregularly punctate.

TYPES—Holotype: Male, Douglas Co., Kans., May 11, 1949 (R. H. Beamer, on *Amorpha fruticosa*). Allotype: topotypical [both Univ. Kans.]. Paratypes: 6 ♂♂, 1 ♀, topotypical 3 ♂♂, 5 ♀♀, Miami Co., Kans., May 20 & 27, and June 1, 1951 (C. D. Michener, on *Amorpha fruticosa*); 2 ♀♀, 5 mi. south and 6 mi. SW of Lawrence, Kans., June 10 & 12, 1950 (C. D. Michener and J. R. White, on *Amorpha fruticosa*); 1 ♂, Hamilton, Ga., May 19, 1931 (P. W. Fattig). Paratypes are in collections of the University of Kansas, the U. S. National Museum and the author.

The author is indebted to C. D. Michener not only for the material upon which the description of *micheneri* is based, but for critical observations concerning the characters, distribution and correlation of the sexes in the related species of *Robertsonella*.

Hoplitis (Robertsonella) gleasoni Titus

(Fig. 25)

Robertsonella gleasoni Titus, 1904. N. Y. Ent. Soc. Jour. 12, p. 23, ♀ ♂.

Robertsonella crataegina Cockerell, 1909. Ann. Mag. Nat. Hist. (8) 4, p. 28.

Robertsonella simplex crataegina Michener, 1938. Ent. News 49, p. 131.

FEMALE—Agrees with description of *simplex* (below), and reliable characters to separate the two are lacking.

MALE—Length 6.5 mm.; entirely black; face slightly longer than distance between eyes above; eyes considerably converging below; antennal scape slender and unmodified, the pedicel fully exposed, flagella narrow and elongate, segments somewhat longer than broad; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus nearly as long as the maximum width, apical margin slightly produced, nearly straight, entire disc densely covered with short, cream-colored pubescence which completely hides the surface; mandibles distinctly bi-dentate; cheeks subequal to eyes in width; wings subhyaline, veins and stigma brownish testaceous; tegulae shining, piceous, with scattered, very fine punctures; legs entirely black, spurs pale yellow; tergum 7 exposed, rather broadly rounded; sterna 1-5 exposed, apical margin of 1 slightly outcurved and becoming testaceous along rim, 2 quite expansive, slightly swollen on each side of center toward apical margin, but depressed between these two areas, apical margin of 3 very slightly incurved, with a dense, triangular tuft of short, yellowish pubescence medially, apical margins of 4 and 5 relatively straight, but little modified, 6-8 retracted, form as shown (fig. 25); genital armature as shown; pubescence entirely pale, rather thin and inconspicuous except on clypeus (as described above), elongate and rather thin on cheeks below and along lower margin of mandibles, thin and elongate over most of thorax; front femora with a rather conspicuous, posterior fringe of longer, white hairs; abdominal terga 1-4 with whitish, apical fasciae, these evident only at sides of 1, considerably interrupted medially on 2, usually entire on 3 and 4, discal pubescence very short and inconspicuous, hardly evident on the more basal terga but becoming rather copious on 5-7; punctures rather deep and distinct, crowded over most of head, very close on pleura, but becoming sparse on hypoepimeral area just beneath wing base; scutum and scutellum shining, punctures well separated medially, propodeum somewhat shining laterally, with shallow and rather vague punctures, posterior face dull and tessellate, triangular area more or less shining, upper margin vaguely striate just beneath metanotum; abdominal terga 1-4 with fine and rather well separated punctures medially, these becoming quite close at extreme sides, more uniformly fine and close across 5, rather fine and irregular on 6, tergum 7 shining, with a few vague and irregular punctures or striations toward apical margin.

DISTRIBUTION—Texas to Illinois and New Jersey, March to May.

FLOWER RECORDS—*Geranium, Phacelia* and *Rubus*.

The description of the male of *gleasoni* does not agree with the male "type" of the original series, nor will it fit either of the other two species now recognized. It states "pubescence of face white, dense, appressed, that of clypeus long, very dense and snowy-white." That would imply that the pubescence above the clypeus is dense and appressed, which is not true of any of these males. The male designated as type agrees with *crataegina*, having the pubescence of the clypeus very short, dense and appressed, while the hair over the upper half of the face is erect. Apparently the female, which was described first, was made the type. This is unfortunate, as it is indistinguishable from the female of *simplex*.

Hoplitis (Robertsonella) simplex (Cresson)

(Fig. 25)

Heriades simplex Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 384. ♀.

Robertsonella simplex Michener, 1938. Ent. News 49, p. 130.

FEMALE—Length 6.5-8 mm.; entirely black; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus very slightly convex, apical margin somewhat produced, practically straight, mandibles only slightly broadened apically, distinctly tri-dentate, median tooth only slightly nearer apex than to inner angle; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, stigma brownish-piceous, veins more brownish-testaceous; tegulae shining, piceous, with punctures hardly evident; legs entirely black, spurs pale yellow; pubescence entirely pale, rather short and thin, but quite copious around antennae, on face below, and over much of thorax, the dorsal pubescence elongate but very thin; abdominal terga 1-4 with narrow, whitish, apical fasciae, these widely interrupted medially on 1 and 2, usually entire on 3 and 4, 5 not fasciate, discal pubescence exceedingly short and inconspicuous, hardly visible on the more basal terga, but becoming quite dense and subappressed on

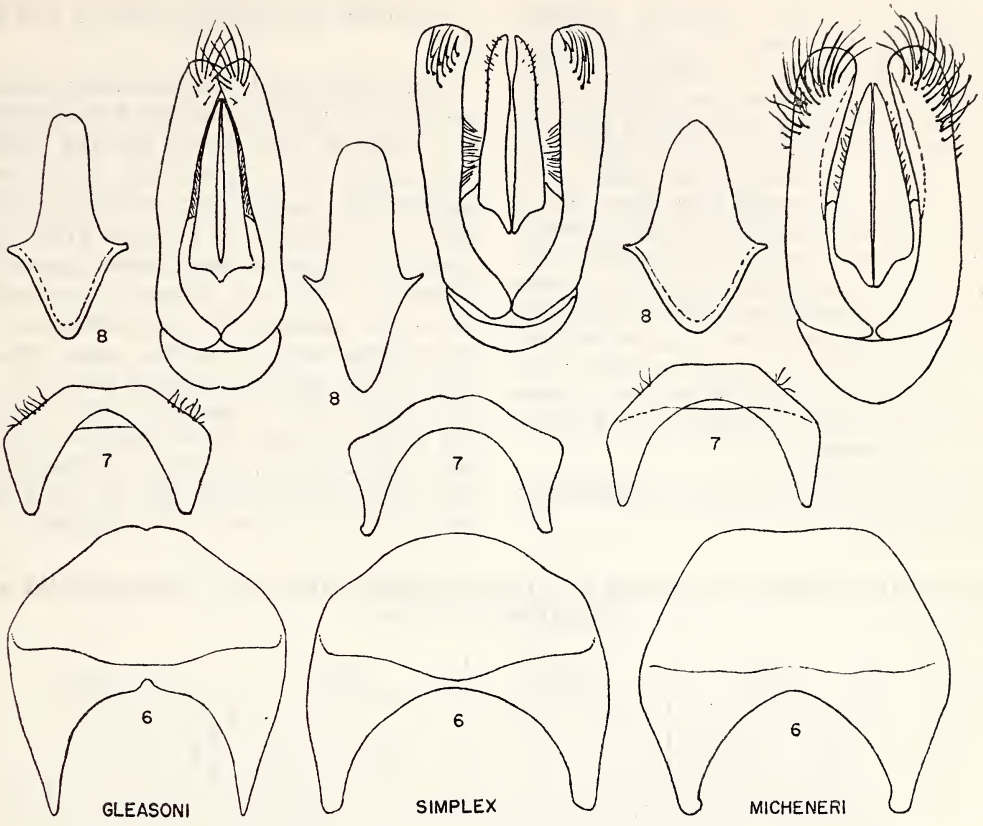


Figure 25—Genital armature and sterna 6-8 in males of *Hoplitis*.

tergum 6, apical margin of 6 very slightly reflexed and shelf-like; scopa entirely yellowish-white; punctures quite deep and distinct, rather coarse and close and somewhat finer on most of face, including vertex, becoming densely crowded on clypeus, close and fine on cheeks, but lower surface shining and impunctate, the two areas separated by a row of long, curled, whitish hairs directed toward the hypostome; scutum and scutellum shining between deep and distinct but quite close punctures, these almost crowded on pleura, the propodeum dull and tessellate, punctures very shallow and indefinite; abdominal terga shining, punctures fine and slightly separated on basal tergum, well separated medially on 2 and 3, uniformly close and fine on 4-6.

MALE—Length 6 mm.; entirely black; face considerably longer than distance between eyes above; eyes very slightly convergent below; antennal scape slender and rather short, not much if any exceeding diameter of flagellum, pedicel completely exposed, flagellar segments slender and simple, considerably longer than broad; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, apical margin slightly produced, nearly straight, disc covered with relatively elongate, more or less erect, whitish pubescence; labrum shining, rather flat and unmodified, median length somewhat less than basal width; mandibles bidentate; cheeks subequal in width to eyes; wings subhyaline, veins and stigma brownish-testaceous; tegulae shining, brownish-testaceous, with minute, scattered punctures; legs entirely black, spurs pale yellow; tergum 7 exposed apically, margin rather broadly rounded, with a slight, subapical impression; sterna 1-5 exposed, apical margin of 2 somewhat outcurved, the disc rather expansive, 3-5 more nearly straight apically, 6-8 retracted, form as shown (fig. 25); genital armature as shown; pubescence entirely pale, rather thin in general, somewhat more copious over head and thorax, rather dense over lower half of face and on cheeks below, abdominal terga 1-5 only vaguely white fasciate apically, and then only at sides; punctures rather fine but deep and distinct over most of head and thorax, densely crowded over most of face, quite close

on vertex and cheeks, becoming somewhat more shallow on cheeks below, lower surface shining and more minutely punctate and more densely pubescent; scutum and scutellum shining, punctures slightly separated in center of discs, otherwise rather close, quite close over most of pleura, becoming rather sparse on a limited area just beneath wing base; lateral faces of propodeum dull and tessellate, without distinct punctures, posterior face also quite dull, relatively impunctate, without a distinct striate area beneath metanotum; abdominal terga 1-5 shining, punctures very fine and well separated medially, becoming somewhat closer on the more apical terga, rather close at sides even on basal tergum, 6 rather closely but irregularly punctate.

DISTRIBUTION—Texas to Connecticut, March to May.

FLOWER RECORDS—*Phacelia* and *Salix*.

Apparently this is the first description of the male of *simplex*, although future studies may indicate that this is not the correct association of the two sexes. It has been pointed out (p. 65) that *crataegina* Cockerell is a synonym of *gleasoni* Titus. The females of *gleasoni* and *simplex* cannot be separated with any degree of certainty, hence the reliance for distinguishing the two species rests upon the males. Therefore, if the male of *gleasoni* proves to be the correct one to associate with *simplex*, the male described above must be given a new name. A study of the distribution of these two forms, as shown by the males, may give the answer to this problem.

Table 3—Distribution of species of *Prochelostoma, Heriades, Ashmeadiella* and *Hoplitis* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Prochelostoma	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
philadelphi						X		X	X		X		X		X			X	X	X	X	X	X			X	
Heriades																											
carinata	X	X	X	X		X	X	X					X					X	X			X			X	X	X
leavitti	X							X	X													X			X	X	X
variolosa	X	X		X				X		X	X								X			X				X	X
Ashmeadiella																											
bucconis							X		X																	X	
floridana																						X					X
Hoplitis																											
albifrons	X						X																				
clypeata (Quebec)																											
cylindrica	X	X				X	X	X			X						X					X				X	
gleasoni									X					X		X						X					
micheneri																										X	
pilosifrons				X	X	X	X	X		X			X	X		X			X		X					X	
producta	X	X				X	X	X			X		X		X	X			X		X	X				X	
simplex						X															X					X	
truncata	X			X			X	X					X	X				X			X	X		X		X	X

Osmia Panzer

(Fig. 1)

Osmia Panzer, 1806. Krit. Rev. Insektenf. Deutschlands, v. 2, p. 230. Type: (*Apis bicornis* Linnaeus) = *Apis rufa* Linnaeus. Desig. by Latreille, 1810.

Amblys Klug, 1807. Mag. Insektenk. 6, p. 198. Type: *Apis rufa* Linnaeus. Desig. by Latreille, 1810.

Osmia subg. *Ceratosmia* Thomson, 1872. Hym. Scand., 2, p. 232. Type: *Apis rufa* Linnaeus. Monob.

Osmia subg. *Aceratosmia* Schmiedeknecht, 1885 ? Apidae Europaeae, 2, p. 19. Type: *Osmia emarginata* Lepeletier. Desig. by Sandhouse, 1939.

Osmia subg. *Chalcosmia* Schmiedeknecht, 1885? Apidae Europaeae, 2, p. 886. Type: *Osmia fulviventris* Latreille. Desig. by Sandhouse, 1939.

Osmia subg. *Melanosmia* Schmiedeknecht, 1885? Apidae Europaeae, 2, p. 885. Type: *Osmia fuciformis* Latreille. Desig. by Sandhouse, 1939.

Nothosmia Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 75. Type: *Osmia distincta* Cresson. Orig. desig. and monob.

Acanthosmioides Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 76. Type: *Osmia odontogaster* Cockerell. Orig. desig. and monob.

Osmia subg. *Pachyosmia* Ducke, 1900. Ber. naturw.-med. Ver. Innsbruck 25, p. 18. Type: *Osmia rufa* (Linnaeus). Desig. by Sandhouse, 1939.

Centrosmia Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 165. Type: *Osmia bucephala* Cresson. Orig. desig. and monob.

Gnathosmia Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 165. Type: *Osmia georgica* Cresson. Orig. desig. and monob.

Leucosmia Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 166. Type: *Osmia albiventris* Cresson. Orig. desig. and monob.

Xanthosmia Robertson, 1903. Amer. Ent Soc. Trans. 29, p. 166. Type: *Osmia cordata* Robertson. Orig. desig. and monob.

Monilosmia Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 166. Type: (*Osmia canadensis* Cresson) = *Osmia simillima* Smith. Orig. desig. and monob.

Diceratosmia Robertson, 1904. Amer. Ent. Soc. Trans. 29, p. 166. Type: (*Osmia quadridentata* Cresson) = *Osmia conjuncta* Cresson. Monob. and orig. desig.

Cephalosmia Sladen, 1916. Canad. Ent. 48, p. 270. Type: (*Osmia armaticeps* Cresson) = *Osmia montana* Cresson. Monob.

Osmia Sandhouse, 1924. Calif. Acad. Sci. Proc. (4) 13, p. 357-364.

Osmia Sandhouse, 1925. Canad. Ent. 57, pp. 35-41. (key)

Acanthosmioides Michener, 1936. Amer. Mus. Novitates 875, pp. 27-28. (key)

Osmia Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, pp. 1-167. (revision)

Diceratosmia Michener, 1949. Ent. Soc. Amer. Ann. 42, p. 258. (revision)

Osmia subg. *Acanthosmioides* White, 1952. Univ. Kans. Sci. Bul. 35, pp. 219-307. (revision)

Osmia Sinha, 1958. Univ. Kans. Sci. Bul. 39, pp. 211-261. (subgeneric revision)

Osmia subg. *Chenosmia* Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 233. Type: *Osmia pentstemonis* Cockerell. Orig. desig.

Osmia subg. *Centrosmia* Sinha and Michener, 1958. Univ. Kans. Sci. Bul. 39, pp. 275-303. (revision)

This genus is a group of metallic green, blue or blue-green bees, with a short, robust body form. The basal abdominal tergum is flattened anteriorly but hardly concave, sometimes with a vague median sulcus. The metanotum and posterior face of the propodeum are perpendicular, forming the posterior surface of the thorax, and the scutellum is rounded, with rather large axillae. The notaulices are punctiform and obscure. In the front wings both recurrent veins are received well within the limits of the 2nd submarginal cell. Arolia are evident between the claws, and the maxillary palpi are 5-segmented. Usually the abdominal terga are not fasciate. In the males tergum 6 usually has a small median apical emargination, and 7 is more deeply emarginate but is largely covered by 6. Sterna 1, 2 and 4 are exposed, but 3 is commonly hidden beneath sternum 2, while 5-8 are retracted and variously modified.

There is a considerable diversity of nesting habits in *Osmia*, some of them excavating burrows in the soil, others using plant stems, vacated burrows of other bees, and empty snail shells. Sometimes these are lined with a paste made from plant tissue, and partitions between cells, or plugs closing the ends of the burrows, may be of this same material.

KEY TO SPECIES

Females

1. Malar space present 2
   Malar space absent 6

2. Clypeus with a deep, quadrate, median emargination ... *(Osmia) lignaria* Say (p. 72)
Apical margin of clypeus thickened or otherwise modified 3

3. Clypeal margin somewhat excavated on each side of a median, elevated process *(Chalcosmia)* 4
Clypeal margin greatly thickened, but neither excavated nor emarginate .... *(Centrosmia)* 5

4. Larger (13-14 mm.); front wings deeply infuscated, median clypeal process more robust, not noticeably emarginate .... *chalybea* Smith (p. 84)
Smaller (11-12 mm.); front wings only lightly infuscated; median process of clypeus relatively low and inconspicuous, its margin quite deeply emarginate ..... *texana* Cresson (p. 87)

5(3). Entirely black; clypeus with a rather short, median, raised line toward apical margin, gradually thickened toward the margin .... *nigriventris* (Zetterstedt) (p. 77)
Black, with bluish-green reflections; clypeus without a median raised line, the margin abruptly thickened .... *bucephala* Cresson (p. 76)

6(1). Mandible with a robust superior tooth projecting above clypeal margin..... *(Chalcosmia) georgica* Cresson (p. 86)
Mandibles simple 7

7. Abdominal terga with distinct, apical fasciae ..*(Chalcosmia) caerulescens* Linnaeus (p. 85)
Abdomen not distinctly fasciate 8

8. Scopa black ....(*Chenosmia* in part) 9
Scopa white 18

9. Front basitarsus compressed, outer face slightly concave ....(*Monilosmia*) *simillima* Smith (p. 80)
Front basitarsus but slightly compressed, outer face not at all concave..... 10

10. Black, non-metallic; clypeus with conspicuous black pubescence .... *inermis* Zetterstedt (p. 98)
Color metallic greenish or bluish 11

11. Abdominal terga 2-5 with broad, impunctate, apical margins, these equal to about a third or fourth of the total median length of the plate 12
Apical bands of terga either very narrow or to some degree invaded by punctures 13

12. Head, pleura, legs and abdominal terga largely pale pubescent .... *?tersula* Cockerell (p. 100)
Head, pleura, legs and abdominal terga 2-6 conspicuously black pubescent .... *(Acanthosmioides) integra* Cresson (p. 73)

13(11) Abdominal terga 3-5 with conspicuous, erect black pubescence; clypeus fuscous or black pubescent 14
Pubescence of abdominal terga and clypeus entirely pale, or with only very inconspicuous darker hairs 17

14. Color brilliant blue or green; abdominal terga completely punctate to the apical rims .... *illinoensis* Robertson (p. 97)
Color dark olive or blue-green; abdominal terga with narrow but distinct, apical, impunctate bands 15

15. Mandibles very broad apically, the dentate margin much broader than the base ..... *(Cephalosmia) subaustralis* Cockerell (p. 75)
Apical dentate margin of mandible no broader than base 16

16. Front basitarsi slender, about four times longer than broad; 1st recurrent vein entering 2nd submarginal cell about twice the distance from its base as 2nd does from apex .... *proxima* Cresson (p. 99)
Front basitarsi broader, hardly three times as long as broad; 1st recurrent vein entering 2nd submarginal cell three or four times as far from base as 2nd does from apex .... *collinsiae* Robertson (p. 96)

17(13) Pubescence of abdomen dorsally entirely pale; front basitarsi slender, entirely pale pubescent .... *atriventris* Cresson (p. 95)
Abdomen dorsally with some short, inconspicuous, darker hairs in the generally pale pubescence; front basitarsi broader and more robust, with long, more or less curled, brownish hairs ... ...*(Monilosmia) felti* Cockerell (p. 79)

18(8). Tergum 6 thinly pubescent, with a distinct, dense, white, apical fascia, the punctures close and coarse *(Diceratosmia)* 19
Tergum 6 more finely punctate, the pubescence gradually becoming more dense to the apical margin *(Nothosmia)* .. 21

19. Front between antennae with two small but distinct tubercles; inner mandibular tooth more truncate .... *conjuncta* Cresson (p. 81)
Front without distinct tubercles; inner mandibular tooth acute..... 20

20. More robust (abdominal width 3 mm.); purplish-blue; clypeus rather finely rugoso-punctate ..... *subfasciata miamiensis* new subspecies (p. 84)
Less robust (abdominal width 2.5 mm.); greenish-blue; clypeal punctures contiguous but distinct..... *subfasciata subfasciata* Cresson (p. 83)

21(18). Clypeus with a median, triangular, polished, impunctate area on dorsal margin ..... *inspergens* Lovell and Cockerell (p. 91)
Clypeus uniformly punctured 22

22. Interocellar pubescence long and proclinate, meeting tips of the more erect hairs between antennae; area below ocelli suffused with purplish-black..... *distincta* Cresson (p. 90)
Interocellar pubescence short and erect; area below ocelli little if any darkened 23

23. Punctures coarse and confluent over most of scutum and scutellum..... 24
Punctures of scutum and scutellum relative fine and distinct, not confluent, at least in center of disc..... 25

24. Abdominal terga with narrow but definite, apical, impunctate bands ..... *cordata* Robertson (p. 89)
Abdominal terga completely punctate to the apical rims, without impunctate bands .. *sandhouseae* Mitchell (p. 94)

25(23). Wings clouded apically; punctures of abdominal terga deep and distinct to the apical margin ....*pumila* Cresson (p. 93)
Wings not clouded apically; apical margins of abdominal terga rather broadly impunctate ..... *albiventris* Cresson (p. 88)

Males

1. Tergum 6 with broad, lateral emarginations, tergum 7 bidentate *(Diceratosmia)* 2
Tergum 6 with but a single, median emargination or none 4

2. Tergum 6 with acute lateral angles..... *conjuncta* Cresson (p. 81)
Tergum 6 with broadly rounded lateral angles 3

3. Greenish-blue ..... *subfasciata subfasciata* Cresson (p. 83)
Purplish-blue ..... *subfasciata miamiensis* new subspecies (p. 84)

4(1). Abdominal tergum 6 entire; apical margin of sternum 4 not grooved ... 5
Tergum 6 usually with a distinct, apical, median emargination; if not, then apical margin of sternum 4 narrowly but distinctly grooved 10

5. Mid tarsi slender and simple 6
Mid tarsal segments dilated, more or less swollen or compressed 9

6. Hind basitarsi strongly dilated apically, the base slender ....*(Centrosmia) nigriventris* Zetterstedt (p. 77)
Hind basitarsi parallel-sided 7

7. Median segments of flagellum hardly twice as long as broad; apical margin of sternum 3 fully exposed, with a deep but rather narrow, median emargination 8
Median flagellar segments narrow and elongate, more than twice as long as their breadth; apical margin of sternum 3 largely covered, with a very broad emarginate area .... *(Osmia) lignaria* Say (p. 72)

8. Inner apical angle of mandible a right angle, the apical tooth long and slender ....*(Acanthosmioides) integra* Cresson (p. 73)
Inner apical angle of mandible acute, the inner and outer angles or teeth subequal ..*(Cephalosmia) subaustralis* Cockerell (p. 75)

9(5). Inner hind tibial spur nearly equalling basitarsi in length; mid tarsal segments very broadly dilated, nearly tri-angular in cross-section ..... *(Centrosmia) bucephala* Cresson (p. 76)
Inner hind tibial spur little more than half the length of hind basitarsi; mid tarsal segments slightly swollen and compressed ....*(Monilosmia) felti* Cockerell (p. 79)

10(4). Apical margin of abdominal sternum 4 thickened *(Chalcosmia)* 11
Apical margin of sternum 4 neither thickened nor grooved 14

11. Tooth of hind basitarsus minute, hardly visible; apical margin of tergum 6 with very shallow, lateral emarginations .. .. *caerulescens* Linnaeus (p. 85)
Hind basitarsus with a distinct submedian tooth on anterior margin; apical margin of tergum 6 entire laterally 12

12. Lateral ocelli slightly nearer margin of vertex than to each other .... *georgica* Cresson (p. 86)

Lateral ocelli much nearer each other than to margin of vertex 13

13. Wings deeply infuscated; dorsal area of propodeum densely tessellate and dull; tergum 6 deeply emarginate .... *chalybea* Smith (p. 84)
Wings faintly infuscated; lower half of dorsal area of propodeum smooth and shining; tergum 6 usually with only a small, shallow median emargination.. ..... *texana* Cresson (p. 87)

14(10). Apical margin of sternum 4 produced medially, this area broadly incurved ..... *inspergens* Lovell and Cockerell (p. 91)
Apical margin of sternum 4 evenly outcurved or somewhat produced medially 15

15. Hind basitarsi dilated apically, nearly bare ..... *simillima* Smith (p. 80)
Hind basitarsi more parallel-sided, or densely setose beneath 16

16. Mid tarsi much modified, the basitarsi robust, expanded apically, 2nd segment slender at base, expanded apically..... ..... *tarsata* Provancher (p. 78)
Mid tarsi simple and unmodified.....17

17. Emargination of sternum 3 two-thirds the width of the plate .... *distincta* Cresson (p. 90)
Emargination of sternum 3 about half or less width of plate 18

18. Color entirely black, with no metallic reflections ... *inermis* Zetterstedt (p. 98)
Color largely metallic 19

19. Tergum 7 with a shallow emargination; apical margin of 6 weakly arcuate, with a very small, median emargination; sides of 5 and 6 with unusually long hairs ..... *albiventris* Cresson (p. 88)
Tergum 7 deeply emarginate; apical margin of 6 strongly arcuate, usually deeply emarginate medially; hairs on segments laterally of ordinary length . 20

20. Abdominal terga with wide, impunctate, depressed, marginal areas which occupy about one-fourth of the median length of each tergum 21
Depressed apical areas of terga much narrower 22

21. Apical margin of sternum 4 straight for almost entire width of plate, not at all thickened ... *virga* Sandhouse (p. 101)
Sternum 4 thickened apically, the margin produced medially, this area very slightly incurved . *tersula* Cockerell (p. 100)

22(20). Brilliant green, with bluish reflections ..... *illinoensis* Robertson (p. 97)
Dark bluish or olive-green..... 23

23. Scutum dull, punctures closely crowded.. 24
Punctures of scutum close, but distinct, the narrow interspaces shining 25

24. Abdominal tergum 6 finely and closely punctate throughout .... *cordata* Robertson (p. 89)
Tergum 6 shining, punctures fine, shallow and quite sparse .... *sandhouseae* Mitchell (p. 94)

25(23). Median emargination of sternum 3 completely filled by the marginal fringe, the hairs converging along mid-line . 26
Median emargination of sternum 3 not filled by the marginal fringe, hairs relatively short 27

26. Depressed, apical areas of abdominal terga largely impunctate, invaded only slightly by the discal punctures .... *proxima* Cresson (p. 99)
Apical margins of abdominal terga only very narrowly impunctate .... *atriventris* Cresson (p. 95)

27(25). Sternum 4 with a distinct, median, impunctate furrow dividing the setose area into right and left halves..... ..... *collinsiae* Robertson (p. 96)
Sternum 4 without such a median furrow 28

28. Median emargination of sternum 3 quite broad, occupying nearly half of the total width of the plate, and with a short but quite dense fringe; hind basitarsi not toothed .... *michiganensis* new species (p. 92)
Median emargination of sternum 3 not so broad, the fringe rather thin and inconspicuous; hind basitarsi with a small but definite, submedian tooth .... *pumila* Cresson (p. 93)

Osmia (Osmia) lignaria lignaria Say

(Figs. 30-35)

Osmia lignaria Say, 1837. Boston Jour. Nat. Hist. 1, p. 399. ♀ ♂.

Osmia purpuracens Smith, 1849. Zoologist 7 (append.), lviii. ♂.

Osmia lignaria Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 203. (biology)

Ceratosmia lignaria Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Osmia) lignaria Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 10.

Osmia (Osmia) lignaria Michener, 1953. Kans. Univ. Sci. Bul. 35. p. 1057. (larva)
Osmia lignaria Bohart, 1955. Ent. Soc. Wash. Proc. 57, pp. 203-204. (biology)

FEMALE—Length 10-11 mm.; dark blue, becoming greenish on vertex, dorsum of thorax and abdominal terga; face only slightly longer than distance between eyes above; eyes subparallel; lateral ocelli somewhat nearer each other than to eyes, and nearer eyes than to margin of vertex; apical margin of clypeus somewhat produced, with a broad and deep, subquadrangular, median emargination (fig. 30); median length of labrum somewhat greater than basal width, slightly narrowed and truncate apically, with a sub-basal, transverse brush of hairs; mandibles rather slender and elongate, bidentate apically, with a small, inconspicuous, submedian tooth (fig. 32); width of cheeks nearly twice that of eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell only slightly nearer apex than 1st does to base; tarsal segments simple and unmodified; front spurs brownish-hyaline, mid and hind spurs piceous; pubescence, including scopa, largely black, but pale with intermixed, rather long and erect fuscous hairs around antennae and on dorsum of thorax, entirely pale on basal abdominal tergum and on tergum 2 except apical margin; punctures deep and distinct in general, fine and quite close over most of head and on dorsum of thorax, becoming somewhat more widely separated but still quite close on scutum posteriorly and on scutellum, pleura and propodeum dull, punctures fine and almost crowded; punctures somewhat finer on abdominal terga medially, distinctly but not widely separated, becoming very fine toward sides, and uniformily close on tergum 5, densely crowded and minute on 6.

MALE—Length 9-10 mm.; dark blue, with greenish tints on face, vertex and dorsum of thorax; face only slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli somewhat nearer margin of vertex than to each other, somewhat more removed from eyes; clypeus rather strongly convex, apical margin considerably produced, nearly straight; median length of labrum nearly equal to basal width; mandible bidentate; cheeks considerably broader than eyes; wings very lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments slender and simple, anterior margin of hind basitarsus with a small but distinct tooth near apical third; front spurs brownish-hyaline, mid and hind spurs piceous; pubescence elongate, largely pale on head and thorax, but with intermixed fuscous hairs on vertex, that on upper part of pleura and propodeum black; pubescence pale on abdominal terga 1 and 2, becoming obscurely darkened at apex of 2, entirely black, rather elongate and conspicuous on 3-6; punctures quite deep and distinct, rather fine and close in general, close but not crowded on vertex, cheeks and scutum, somewhat more widely separated on scutellum; pleura dull, with rather fine and densely crowded punctures; lateral faces of propodeum somewhat smoother, punctures fine and rather shallow, posterior face dull and tessellate, punctures becoming inevident medially, propodeal triangle dull and tessellate but rather smooth; punctures of abdominal terga somewhat finer, more distinctly separated medially on 1-5, becoming slightly closer toward extreme sides, 6 without a median, emarginate area, 7 rather evenly rounded, apex medially with a very shallow emargination; sternum 2 broadly rounded apically, largely covering 3 and to a considerable degree 4, 3 with a very broad, apical, emarginate area, this with a median, restricted, setose area, the setae converging along midline (fig. 33); apical margin of sternum 4 somewhat thickened and grooved (fig. 34), 5-8 entirely retracted, not markedly modified, 8 rather elongate, triangular, apex acute; gonocoxites of genital armature slender and elongate, apex with a subapical, ventral, slender projection (figs. 31 and 35).

DISTRIBUTION — British Columbia to Quebec and the New England states, south to California, Oklahoma and Georgia, March to June.

FLOWER RECORDS—*Cercis, Fragaria, Geranium, Lupinus, Malus, Prunus, Rubus, Salix, Taraxacum, Vicia* and *Viola.* Robertson (1929) records *lignaria* also on *Camassia, Cardamine, Chaerophyllum, Claytonia, Collinsia, Dentaria, Dicentra, Direa, Erigenia, Erythronium, Hydrophyllum, Mertensia, Osmorrhiza, Oxalis, Polymonium, Pyrus, Ranunculus, Ribes, Stellaria, Taenidia, Viburnum* and *Zanthoxylum.*

The subspecific designation of *lignaria* is made necessary by the recognition of another subspecies, *propinqua* Cresson, that is found in the West.

Osmia (Acanthosmioides) integra Cresson

(Figs. 26 & 32)

Osmia integra Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 106. ♂.
Osmia novomexicana Cockerell, 1903. Ent. News 14, p. 331. ♀.

Osmia florissanticola Cockerell, 1906. Amer. Mus. Nat. Hist. Bul. 22, p. 450. ♀.
Osmia integra Cockerell, 1910. Ent. News 21, p. 270. ♂.
Osmia novomexicana Hicks, 1926. Colo. Univ. Studies 15, p. 246. (biology)
Osmia (Acanthosmioides) integra Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 56.
Osmia integra White, 1952. Univ. Kans. Sci. Bul. 35, p. 290.

FEMALE — Length 12 mm.; greenish-blue, becoming more distinctly green on dorsum of thorax, legs black; face much longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex, very slightly nearer to each other; clypeus convex, much produced apically but not at all thickened, median area of apical margin nearly straight, narrowly shining and impunctate; median length of labrum about equal to basal width; mandibles obscurely 4-dentate (fig. 32); cheeks considerably broader than eyes; wings subhyaline basally, becoming faintly infuscated along apical margin, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence quite copious, yellowish-white on dorsum of thorax and basal abdominal tergum, with pale hairs in part on vertex, elsewhere black, scopa entirely black; discal pubescence of terga 2-5 rather long and erect, quite copious, entirely black; punctures in general quite deep and distinct close in large part, close but not crowded on vertex and on cheeks below but somewhat crowded on median area of cheeks, subcontiguous below ocelli, becoming very fine and close at sides of face below, clypeus closely and quite coarsely punctate above, becoming very finely and obscurely punctate toward apical margin; punctures of scutum fine and densely crowded anteriorly, becoming somewhat more coarse and distinct but still close posteriorly, those on scutellum uniformly close and rather fine; punctures of pleura rather fine and shallow, close in general; lateral faces of propodeum dull but rather smooth, posterior face obscurely but more definitely punctate, dorsal area velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga shining, median punctures of 1-4 fine and rather widely separated but not sparse, becoming close toward sides, apical margins rather broadly impressed and entirely impunctate, tergum 5 somewhat more closely punctate and 6 very finely and densely punctate throughout.

MALE—Length 13 mm.; bluish-green, the vertex, upper half of face and dorsum of thorax somewhat brassy, legs black; face much

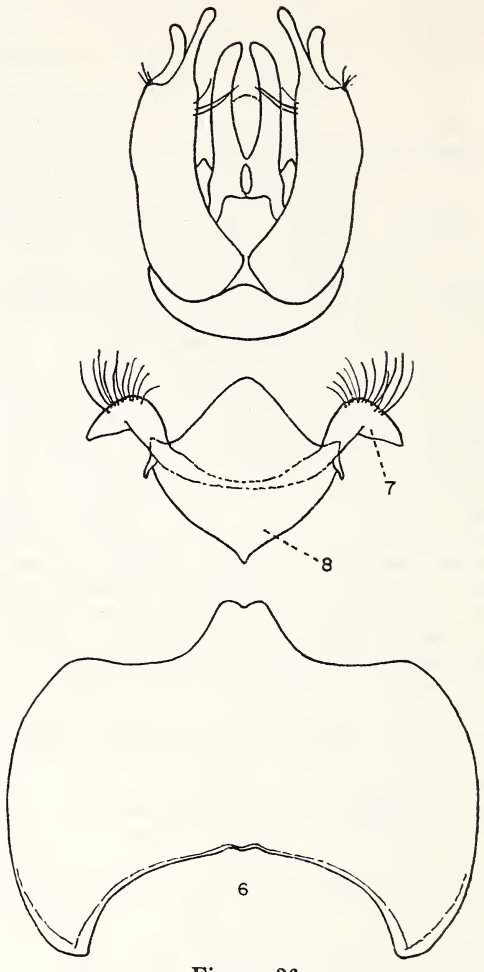


Figure 26
Genital armature and sterna 6-8 in male of *Osmia integra.*

longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus slightly convex, apical margin considerably produced, nearly straight; median length of labrum considerably less than basal width; mandible bidentate, inner tooth broadly truncate; cheeks considerably broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell about half the distance from apex as 1st does to base; tarsal segments unmodified, anterior margin of hind basitarsus not toothed; front spurs testaceous-hyaline, mid and hind spurs black; pubescence elongate, whitish on face, pleura and terga 1 and 2, more yellowish on vertex and dorsum of thorax, black on cheeks, mid and hind legs, and terga 3-6; punctures fine and densely crowded over most

of head and thorax lateral faces of propodeum somewhat smoother, punctures fine and rather shallow, posterior face dull and tessellate, punctures becoming inevident medially, propodeal triangle dull and tessellate but rather smooth; punctures of abdominal terga somewhat finer, more distinctly separated medially on 1-5, becoming slightly closer toward extreme sides, apical margins quite broadly shining and impunctate; apical margin of tergum 6 nearly straight, without a median emargination, 7 broadly subtruncate, with a shallow median emargination; sternum 2 slightly outcurved apically, with a small, shallow, median emargination, not hiding margins of 3 and 4, 3 with a quite deep, median emarginate area which is conspicuously fringed, but the setae short, not meeting at midline; apical margin of sternum 4 broadly rounded, not at all thickened, margin of 5 nearly straight, 6-8 (fig. 26) retracted, lateral portions of 7 quite heavily sclerotized and setose; genital armature as shown.

DISTRIBUTION — British Columbia to New Mexico, east to Michigan, April to June. This is the first record of *integra* in the East, and is based on the following: 2 ♀♀, Chippewa Co., Mich., June 7, 1959 (Dreisbach).

Osmia (Cephalosmia) subaustralis subaustralis Cockerell

(Figs. 31 & 32)

Osmia nigrifrons var. *subaustralis* Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 5, p. 410. ♀.
Osmia wardiana Cockerell, 1907. Ann. Mag. Nat. Hist.. (7) 19, p. 368. ♀.
Osmia seneciophila Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 446. ♂.
Osmia lyncis Cockerell, 1937. South. Calif. Acad. Sci. Bul. 36, p. 110. ♀.
Osmia (Cephalosmia) subaustralis Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 28.

FEMALE—Length 10 mm.; bluish-green; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus quite strongly convex and strongly produced apically, median area of apical margin shining and impunctate; median length of labrum somewhat greater than basal width; margin of hypostome strongly carinate, these carinae slightly reduced toward base of mandible; mandibles somewhat constricted just before base, broadly expanded apically, with two distinct teeth and a broad, bevelled area above (as shown, fig. 32); width of cheeks nearly twice that of eyes; wings lightly infuscated, more deeply so in region of marginal cell, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments simple and unmodified, front spurs yellowish-hyaline, mid and hind spurs piceous; pubescence rather thin but long and erect, pale, with an intermixture of blackish hairs on vertex and dorsum of thorax, on face, cheeks and basal abdominal tergum, largely blackish on clypeus, pleura and discs of abdominal terga 2-6, the scopa black; punctures in general, deep and distinct, but not very coarse, well separated and rather coarse on vertex, becoming very fine and close on face below, somewhat more coarse and irregular on clypeus, very fine and distinctly separated on cheeks medially, but becoming coarser and more shallow and obscure toward the hypostomal carinae; punctures rather densely crowded along anterior margin of scutum, becoming well separated along median line posteriorly, close and rather coarse on scutellum, rather shallow and densely crowded on the dull pleura; propodeum dull, densely tessellate, with no evident punctures; abdominal terga 2 and 3 with fine, well separated punctures medially, becoming somewhat finer and quite close toward sides, rather coarse on tergum 1 basally but becoming very fine and more sparse toward apical margin, somewhat coarser but well separated on 4, closer on 5, very close and minute on 6, apical margins of the terga rather narrowly impunctate and more bluish in color.

MALE — Length 10-11 mm.; head and thorax bluish-green above, somewhat more bluish below, basal abdominal tergum somewhat more greenish, the following terga blue, legs black; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; clypeus only slightly convex, apical margin considerably produced, slightly outcurved, with a very faint, median indentation; mandibles bidentate, teeth nearly equal; cheeks very slightly broader than eyes; wings subhyaline, veins testaceous to piceous, 2nd recurrent vein entering 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments slender and simple, hind basitarsus without a median denticle; front spurs testaceous, mid and hind spurs black; pubescence pale ochraceous to whitish, rather long and copious on face, vertex, dorsum of thorax and basal abdominal tergum, largely black on legs and terga 2-6; cheeks with rather short, pale pubescence interspersed with elongate black hairs, front femora with a tuft of whitish hairs posteriorly, pleura with intermixed light and dark hairs, and propodeum largely black pubescent laterally, pale pubescent medially; punctures fine and close on head and thorax, but somewhat coarser and more distinct between eyes and ocelli and on upper

part of face, fine and densely crowded on clypeus beneath dense pubescence, quite closely crowded on cheeks and over most of scutum, but somewhat more distinct on scutum along mid-line posteriorly, those on scutellum quite coarse, deep and distinct but still close; punctures of abdominal terga minute and slightly separated but still quite close, becoming more closely crowded on the more apical plates; tergum 6 rather broadly rounded apically, with a very small and obscure, median emargination; tergum 7 narrowly but abruptly produced medially, this area quite broadly emarginate; sternum 2 broadly rounded apically, not hiding apical margin of 3 which is quite deeply emarginate medially, this area densely fringed with rather elongate hairs which do not meet along mid-line (somewhat as in *inspergens*, fig. 33); sternum 4 rather narrowly produced medially, this area slightly incurved and fringed with dark hairs, 6 entirely retracted, its apical margin rather narrowly produced medially, with a rather small tuft of hairs on each extreme side, 7 slightly sclerotized medially, this area produced and abruptly truncate; apex of gonocoxites as shown (fig. 31).

DISTRIBUTION—Washington and Oregon to New Mexico, east to Michigan, June and July. This is the first record of this species in the East, the collection data as follows: 5 ♀♀, Alpena Co., Mich., July 4, 1940 (Dreisbach).

In the type specimen, a female from New Mexico, the mandibles are not quite as broad apically as in this series from Michigan, the space between the ocelli and margin of vertex is somewhat narrower, and the rims of the abdominal terga are strongly reddened. The degree of these differences does not seem to justify recognition of this eastern form as a subspecies, at least until males also have been studied. The male described above is from Oregon and was identified by Sandhouse.

Another subspecies, *austromontana* Michener, occurs in southern California.

Osmia (Centrosmia) bucephala bucephala Cresson

(Figs. 27 & 32)

Osmia bucephala Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 17. ♀.

Osmia megacephala Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 18. ♀.

Osmia latitarsis Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 20. ♂.

Osmia lignivora Packard, 1867. Amer. Nat. 1, p. 375. (biology)

Osmia lignicola Provancher, 1882. Nat. Canad. 13, p. 208. ♀.

Osmia lignivora Cockerell, 1907. Colo. Univ. Studies 5, p. 37. ♀.

Centrosmia bucephala Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Melanosmia) bucephala Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 37.

FEMALE — Length 15-16 mm.; black, with bluish reflections; length of face to anterior ocellus equal to distance between eyes; eyes subparallel; lateral ocelli much nearer each other than to eyes, and slightly nearer eyes than to margin of vertex; clypeus quite strongly convex, apical margin considerably produced and very strongly thickened, strongly depressed just above this area; labrum subquadrate, only very slightly longer than basal width; mandibles 3-dentate, as shown (fig. 32); width of cheeks about twice that of eyes; wings lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments quite short, simple and unmodified, mid and hind spurs piceous; pubescence yellowish-white around antennae, on vertex, dorsum of thorax and in large part on abdominal terga 1 and 2, elsewhere, including the scopa, black; punctures in general, fine and rather close, slightly separated on each side of clypeus, around ocelli and over most of cheeks, quite dense on supraclypeal area, clypeus medially, sides of face, and vertex medially; punctures slightly separated in center of scutum, otherwise close over dorsum of thorax and on pleura, propodeum smooth but rather dull, punctures hardly evident, dorsal area velvety, upper margin not definitely striate or rugose; punctures of abdominal terga minute and rather close but not crowded on terga 1 and 2, becoming closer on the following terga, apical margins somewhat depressed, but these areas to some degree punctate, punctures becoming more sparse and minute toward the rims; abdominal terga densely and copiously pubescent, this yellowish on 1 and 2, but apex of 2 becoming blackish, and black and erect on 3-5, more or less appressed but still quite dense on 6.

MALE — Length 13-14 mm.; head and thorax largely black, but with vague bluish reflections above, abdomen more definitely bluish; face considerably longer than distance between eyes; eyes subparallel, lateral ocelli somewhat nearer each other than to eyes, and slightly nearer eyes than to margin of vertex; clypeus rather broadly convex, apical margin considerably produced, median area nearly straight but with vague crenulations; labrum short, much broader than the median

length; mandibles bidentate; cheeks only slightly broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; mid tarsal segments much modified, the basitarsus produced apically on inner side, segments 2-4 very broadly dilated apically and strongly thickened, hind basitarsus slender at base and quite broadly dilated toward apex, not tuberculate, mid and hind spurs black, the inner hind spur nearly as long as the basitarsus and strongly curved; pubescence whitish over most of head and thorax, rather dense on front of face, clypeus and lower cheeks, on pleura and around margin of dorsum of thorax, white on basal portions of legs, becoming more or less blackish on tarsal segments; pubescence whitish on terga 1 and 2, black and erect on discs of 3-5, pale with intermixed, blackish hairs on 6; punctures fine and close in general, somewhat separated on each side of vertex above eyes, otherwise quite densely crowded over most of head, close over most of scutum and scutellum, but slightly separated medially on scutum posteriorly and over much of scutellum; punctures very fine and densely crowded on pleura, lateral faces of propodeum smooth and somewhat shining, with vague, minute punctures, posterior face becoming rather dull, without distinct punctures, dorsal area velvety; punctures minute and slightly separated on abdominal terga 1-4 medially, becoming very close and minute laterally, somewhat more uniformly distributed on 5, and becoming minute and rather widely separated on 6, apical margins rather broadly depressed and impunctate on all terga, 6 without a distinct, median emargination, 7 very broad and very shallowly emarginate; sternum 2 broadly subtriangular apically, only partially covering sternum 3, this with a rather narrow, median emarginate area which is largely occupied by convergent setae; sternum 4 rather broadly rounded apically, with a median area beset with elongate, black setae, bare on each side, 5-8 entirely retracted, apical margin of 6 with a rather narrow, median, truncate lobe, 8 produced medially into an elongate, slender, pubescent process; genital armature as shown (fig. 27).

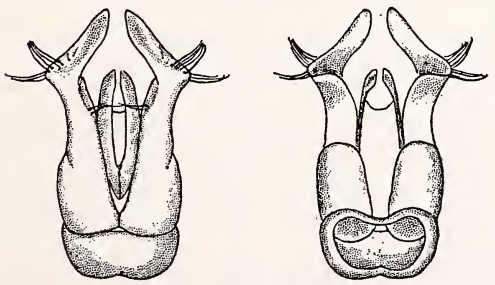


Figure 27
Dorsal (left) and ventral views of genital armature in male of *Osmia bucephala*.

DISTRIBUTION — British Columbia and the Yukon to the New England states, south to Georgia, April to July.

FLOWER RECORDS — *Azalea* and *Pentstemon*. Robertson (1929) records *bucephala* on *Aesculus, Baptisia, Cercis, Dentaria, Dicentra, Erythronium, Mertensia* and *Viola*.

A subspecies from the Northwest, *subornata* Cockerell, makes the subspecific designation of *bucephala* necessary.

Osmia (Centrosmia) nigriventris (Zetterstedt)

(Fig. 32)

Anthophora nigriventris Zetterstedt, 1838. Ins. Lapponica 1, p. 465. ♀
Osmia frigida Smith, 1853. Cat. Hym. Brit. Mus. I, p. 142. ♀ ♂.
Osmia hudsonica Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 21 ♂.
Osmia corticalis Gerstaecker, 1869. Stettin. Ent. Ztg. 30, p. 331. ♀ ♂.
Osmia frigida Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 332. ♀ ♂.
Osmia (Melanosmia) nigriventris Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 35.
Osmia (Centrosmia) nigriventris Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 244.
Osmia (Centrosmia) nigriventris Sinha and Michener, 1958. Univ. Kans. Sci. Bull. 39, p. 284.

FEMALE — Length 11 mm.; entirely black, without metallic reflections; length of face only slightly greater than distance between eyes above; eyes very slightly convergent below; lateral ocelli somewhat nearer eyes than to margin of vertex, much nearer each other; clypeus strongly convex, considerably produced apically, margin strongly thickened, very slightly outcurved, but not otherwise modified; median length of labrum about equal to basal width; mandibles not much broadened apically, rather short, distinctly 4-dentate (fig. 32); cheeks more than double width of eyes; wings lightly infuscated, not much darker apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence largely pale over head, thorax and basal abdominal tergum, with a few blackish hairs behind eyes and some obscure fuscous hairs intermixed on clypeus,

rather short on head but quite dense over front of face, quite elongate and copious on thorax, legs largely black pubescent; scopa entirely black, discs of abdominal terga 2-5 with rather short but erect and conspicuous pubescence, becoming more elongate toward sides, largely pale on tergum 2, with a few dark hairs intermixed, becoming more blackish on the following terga, entirely pale and largely subappressed on tergum 6; punctures rather fine and close in general, close but not crowded on vertex medially, becoming somewhat more distinctly separated but close laterally and on upper cheeks, becoming more crowded on cheeks below, median area between ocelli and antennae densely and finely rugose, rather shallow and sparse on each side of clypeus, but clypeus densely rugose; punctures fine and densely crowded over most of scutum, becoming slightly separated only in center of disc, very fine and close on scutellum, crowded only along posterior margin; pleura dull, punctures fine and very close in general, lateral faces of propodeum smooth but dull, posterior face more tessellate, punctures very minute and obscure, dorsal area velvety, not at all striate along upper margin; abdominal terga somewhat more shining, punctures very fine, rather close but distinctly separated, those in center of each disc becoming minute and rather sparse toward apical margin, these rather broadly but slightly depressed, with minute and sparse punctures; tergum 6 with exceedingly minute, close and evenly distributed punctures.

MALE — Length 10-11 mm.; entirely black, with no metallic reflections; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer each other than to eyes, subequally distant from eyes and margin of vertex; clypeus rather broadly convex, apical margin considerably produced, median area nearly straight; median length of labrum slightly greater than basal width; mandibles bidentate; cheeks much broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; mid tarsal segments slender and simple, hind basitarsus slender at base and broadly dilated toward apex, not tuberculate, mid and hind spurs piceous; pubescence whitish or pale ochraceous over most of head and thorax, rather dense on front of face, clypeus and lower cheeks, on pleura and around margin of dorsum of thorax, largely pale on legs, whitish on basal abdominal tergum, short, suberect and somewhat darker on discs of the following terga; punctures deep, distinct, rather coarse and close on head and thorax, but fine and densely crowded on clypeus, finer and very close on cheeks below, minute and slightly separated on abdominal terga 2-5, somewhat coarser, but shallow and rather close on basal tergum, more widely separated on 6, apical margins rather broadly depressed, with scattered minute punctures; sternum 2 broadly subtriangular apically, only partially covering sternum 3, this with a rather broad, median emarginate area which is largely occupied by convergent setae; sternum 4 somewhat produced, median third subtruncate; tergum 6 without a distinct, median emargination; tergum 7 very shallowly emarginate medially; sterna 5-8 entirely retracted, apical margin of 6 with a median truncate lobe (much as in *simillima*, fig. 28); apex of gonocoxite similar to that in *felti* (fig. 31).

DISTRIBUTION — This species is holarctic and is recorded on this continent in Alaska, across Canada and in the Northwestern and Rocky Mountain states. Although it has not yet been recorded from any of the eastern states, it has been collected in Minnesota and Ontario, and it seems possible that it will eventually be found in some of the border states in the Northeast.

In the Catalog of Hymenoptera (p. 1165) *Osmia xanthomelaena* Smith is included in the synonymy of *nigriventris*. It was described by Smith in 1844 (Zoologist 2, p. 745) but was attributed to Kirby. However, the name *xanthomelaena* was first proposed by Illiger (Magaz. f. Insectenk. 5, 1806, p. 112) and is included in the synonymy of *Osmia fuciformis* by Dalla Torre (Cat. Hym. p. 395). Specimens from Smith's collection were found in the Hope Museum at Oxford, and it is my opinion that they do not represent *nigriventris*. A need for more study of the Palaearctic species in this group is indicated.

Osmia (?Centrosmia) tarsata Provancher

Osmia tarsata Provancher, 1888. Addit. Corr. Faune Ent. Canad. Hym. p. 328. ♂.
Centrosmia tarsata Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 158.
Osmia (Melanosmia) bucephala Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 37.
Osmia (Centrosmia) bucephala Sinha and Michener, 1958. Univ. Kans. Sci. Bul. 39, p. 278.

Both Sandhouse (1939), and Sinha and Michener (1958) have placed *tarsata* in synonymy under *bucephala*. This writer has examined the type in the Provincial Mu-

seum of Quebec and finds that the two are distinct. According to the brief notes that were made, it would run to *bakeri* in the key to *Centrosmia* males by Sinha and Michener, but it does not seem to agree entirely with Sandhouse's description of that species. The middle pair of legs show the most conspicuous differences from both of these species, for in *tarsata* the mid basitarsi are robust, expanded apically, but segment 2 is elongate, slender at the base and expanded apically, while segments 3 and 4 are relatively unmodified. The 6th tergum is very slightly emarginate medially, the 7th deeply emarginate; sternum 4 is not sulcate; and the median emargination of sternum 3 is very narrow.

DISTRIBUTION — Quebec.

Osmia (?Monilosmia) felti Cockerell

(Figs. 31 & 32)

Osmia felti Cockerell, 1911. Ent. News 22, p. 18. ♀.

Osmia (Nothosmia) felti Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 91.

Osmia (Monilosmia?) felti Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 253.

FEMALE—Length 12 mm.; head and thorax blackish, with blue-green tints, abdomen deep blue; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus quite strongly convex, considerably produced apically, margin nearly straight, narrowly polished and impunctate; dentition of mandible as shown (fig. 32); cheeks much broader than eyes; wings lightly infuscated, somewhat more deeply so along apical margin, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence largely yellowish-white on head, thorax and basal segment of abdomen, with only a few darker hairs on clypeus apically, discal pubescence of abdominal terga very thin and sparse, short but erect, dark on tergum 5, pale and subappressed on 6; scopa entirely fuscous; punctures quite close and fine over most of head and thorax, but somewhat separated on vertex laterally, in center of scutum posteriorly, and along anterior portion of scutellum, pleura rather dull, punctures fine and close but rather shallow and indistinct, lateral faces of propodeum somewhat smoother but dull, dorsal area of posterior face velvety, becoming narrowly and obscurely substriate along dorsal margin; abdominal terga shining, punctures deep and distinct across base of each plate, somewhat separated but quite close in general, becoming somewhat more sparse and fine apically, margins quite broadly depressed, but with fine, rather sparse punctures nearly to the rims, tergum 6 densely and very finely punctate.

MALE — Length 9-10 mm.; bluish-green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, somewhat nearer to each other; clypeus convex, somewhat produced apically, margin nearly straight, narrowly polished and impunctate; median length of labrum not quite equal to the basal width; mandible distinctly bidentate; cheeks about equal to eyes in width; wings subhyaline, faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; mid tarsal segments 2-4 strongly compressed, somewhat dilated apically, hind basitarsus not tuberculate; mid and hind spurs piceous; pubescence yellowish-white, without dark intermixture, dense and elongate between antennae and on lower part of face, on cheeks, over most of thorax, and on basal abdominal tergum, short thin and suberect on discs of the following terga; punctures rather fine and close but quite deep over most of head and thorax, slightly separated on vertex laterally, in center of scutum posteriorly and over anterior portion of scutellum, pleura rather dull, with dense and fine punctures, propodeum smooth but rather dull, punctures minute and obscure, dorsal area of posterior face velvety, becoming irregularly finely striate along dorsal margin; abdominal terga 1-5 shining, punctures fine and rather close but not contiguous, apical margins depressed and rather broadly polished and impunctate; tergum 6 minutely and rather sparsely punctate apically, margin without a distinct emargination; tergum 7 rather narrowly produced and with a very small and shallow, median emargination; sternum 2 broadly rounded apically, covering sternum 3 in large part and base of sternum 4, 3 with a narrow, median emargination which is occupied by rather short setae which do not completely converge, 4 rather broadly produced apically, this area rather densely and uniformly setose, 5-8 entirely retracted, 8 triangularly acute apically; penis valves of genital armature slender and much shorter than gonocoxities, apex of gonocoxities as shown, (fig. 31).

DISTRIBUTION — Minnesota to the New England states, south to West Virginia, June to August.

Osmia (Monilosmia) simillima Smith

(Figs. 28, 32 & 35)

Osmia simillima Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 142. ♀ ♂.

Osmia canadensis Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 33. ♂.

Osmia cognata Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 33. ♂.

Osmia major Robertson, 1902. Ent. News 13, p. 79. ♀ (♂ misdet.)

Osmia chlorops Cockerell and Titus, 1902. Amer. Nat. 36, p. 816. ♂.

Osmia simillima Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 332.

Osmia chlorops Cockerell, 1906. Amer. Mus. Nat. Hist. Bul. 22, p. 448. ♂.

Osmia stasima Lovell, 1909. Ent. News 20, p. 125. ♀. New synonymy

Monilosmia canadensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) simillima Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 92.

Osmia (Monilosmia) simillima Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 241.

FEMALE — Length 11-12 mm.; bluish-green, with black legs; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus convex, considerably produced apically, broad apical margin nearly straight, narrowly shining and substriate; median length of labrum subequal to basal width; mandibles obscurely 4-dentate (fig. 32); cheeks much broader than eyes; wings subhyaline basally, becoming lightly infuscated along apical margin and in marginal cell, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; front basitarsi somewhat dilated and flattened, upper surface slightly concave, beset with long curled hairs, tarsi otherwise simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax largely pale, becoming more or less fuscous toward apical margin of clypeus, quite copious and elongate in general, especially over face and around wing bases; scopa black; basal abdominal tergum entirely whitish pubescent, hairs rather copious and elongate, discs of the following terga with more or less erect, but short and rather thin pubescence which becomes more or less fuscous on 4 and 5, 6 largely covered with a rather thin, subappressed, pale tomentum which does not hide surface; punctures quite deep and distinct in general, close but distinct on vertex and cheeks, becoming finer and crowded at sides of face below antennae, clypeus more shallowly rugoso-punctate; punctures close, deep and quite coarse on scutum laterally and anteriorly, becoming rather widely separated near center and toward posterior margin, deep, distinct and quite close over most of scutellum, becoming densely crowded and obscure around posterior margin; pleura rather dull, punctures somewhat more shallow, subcontiguous; propodeum somewhat shining but minutely roughened laterally, posterior face with shallow but rather close and more distinct punctures, dorsal area smooth, becoming narrowly, finely and obscurely substriate along upper margin; abdominal terga shining, punctures fine and distinctly separated medially on 1-4, these becoming more closely punctate toward extreme sides, punctures of 5 more irregular but rather close across entire disc, 6 densely, finely uniformly punctate, apical margins of 2-5 shallowly depressed, invaded by scattered and rather sparse, fine punctures, leaving the narrow, apical rims shining and impunctate.

MALE — Length 10-12 mm.; head and thorax dark olive green, abdomen more bluish-green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex, and each other; each antennal segment slightly dilated apically, resulting in a moniliform appearance; clypeus convex, considerably produced apically, median area of margin nearly straight, narrowly polished and impunctate; median length of labrum subequal to basal width; mandibles obscurely bidentate; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; front tarsal segments slender and simple, mid basitarsi quite short, 2nd fully half its length, hind basitarsi slender basally, becoming quite gradually and broadly dilated apically, 2nd segment about equal in length to that on the 2nd pair of legs, mid and hind spurs piceous; pubescence entirely whitish, quite copious and elongate over most of head and thorax, rather elongate on basal abdominal tergum, discs of terga 2-5 with suberect, short and thin, pale pubescence, that on 6 more scattered and elongate; punctures quite deep and distinct, rather fine and close in general, close but not crowded on vertex and cheeks, becoming crowded below ocelli, clypeus finely and very densely punctate; punctures deep and distinct but rather fine and close over most of scutum, slightly separated only in center, scutellum shining, punctures deeper and more distinct, close but not crowded, but becoming densely crowded and obscure around posterior margin; pleura rather dull, punctures quite deep, distinct, close and rather fine, lateral faces of propodeum somewhat shining and obscurely

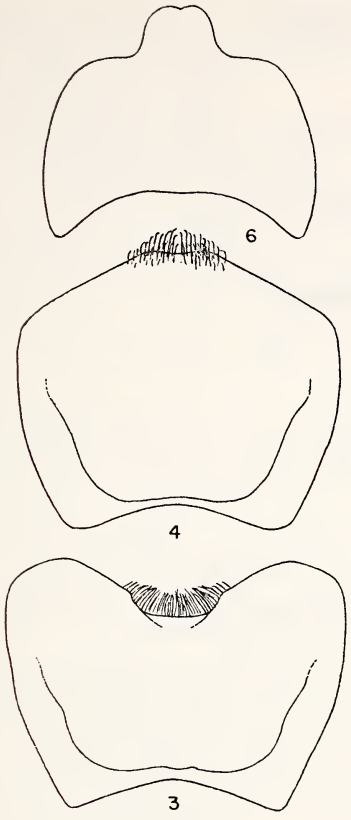


Figure 28
Abdominal sterna 3, 4 and 6 in male of *Osmia simillima*.

lineolate, posterior face more roughened, punctures very vague and obscure but rather close, dorsal area somewhat smooth and shining, becoming very finely and obscurely substriate along upper margin; abdominal terga shining, more finely punctate, punctures quite close but distinct on terga 1-5, these not much closer at extreme sides, apical margins somewhat depressed, invaded to only a slight degree by very fine and rather sparse punctures, rims becoming smooth and impunctate; punctures of tergum 6 scattered, rather sparse and irregular, apical margin with a shallow, median emargination and a slight indentation at each extreme side; tergum 6 narrowly produced apically, with a deep, rounded, median emargination; sternum 2 broadly outcurved apically, covering sternum 3 in large part and base of 4, apical margin of 3 with a very broad, deep, triangular, median emargination which is occupied medially by a dense fringe of elongate, convergent setae (fig. 28); sternum 4 rather broadly produced apically, the median area nearly straight and occupied by rather numerous, elongate, dark setae, 5-8 entirely retracted, 6 with a broad, median, rounded apical lobe, 7 and 8 largely membraneous; genital armature as shown (fig. 35).

DISTRIBUTION — British Columbia to Nova Scotia, south to Arizona and North Carolina, April to August.

FLOWER RECORDS — *Althaea, Barbarea, Pentstemon, Rubus, Vicia* and *Viola*. This is recorded by Robertson (1929) on *Oxalis* and *Ranunculus*.

Osmia (Diceratosmia) conjuncta (Cresson)

(Figs. 29 & 32)

Osmia conjuncta Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 31. ♀.

Osmia 4-dentata Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 107. ♂.

Osmia cressoni Dalla Torre, 1896. Cat. Hym. 10, p. 392. (new name)

Osmia quadridentata Dalla Torre, 1896. Cat. Hym. 10, p. 392. (Emend.)

Osmia conjuncta Sandhouse, 1925. Canad. Ent. 57, pp. 36 & 64.

Osmia conjuncta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia conjuncta Graenicher, 1935. Ent. Soc. Amer. Ann. 28, p. 305.

Osmia conjuncta Rau, 1937. Ent. Soc. Amer. Ann. 30, p. 330.

Diceratosmia conjuncta Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 139.

Diceratosmia conjuncta Michener, 1949. Ent. Soc. Amer. Ann. 42, p. 260.

Osmia (Diceratosmia) conjuncta Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 230.

FEMALE — Length 9 mm.; bluish-green; face slightly longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes, from each other and from margin of vertex; clypeus slightly convex, somewhat produced apically but not at all thickened, median third nearly straight; median length of labrum about equal to its basal width; mandibles tridentate, middle tooth nearer apex than to inner angle (fig. 32); cheeks slightly broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; basitarsi of all legs relatively slender, about equal to the following segments combined, mid and hind spurs dark; pubescence including scopa entirely yellowish-white; punctures in general, deep and distinct, coarse and close on vertex, becoming very coarse and crowded, or subreti-

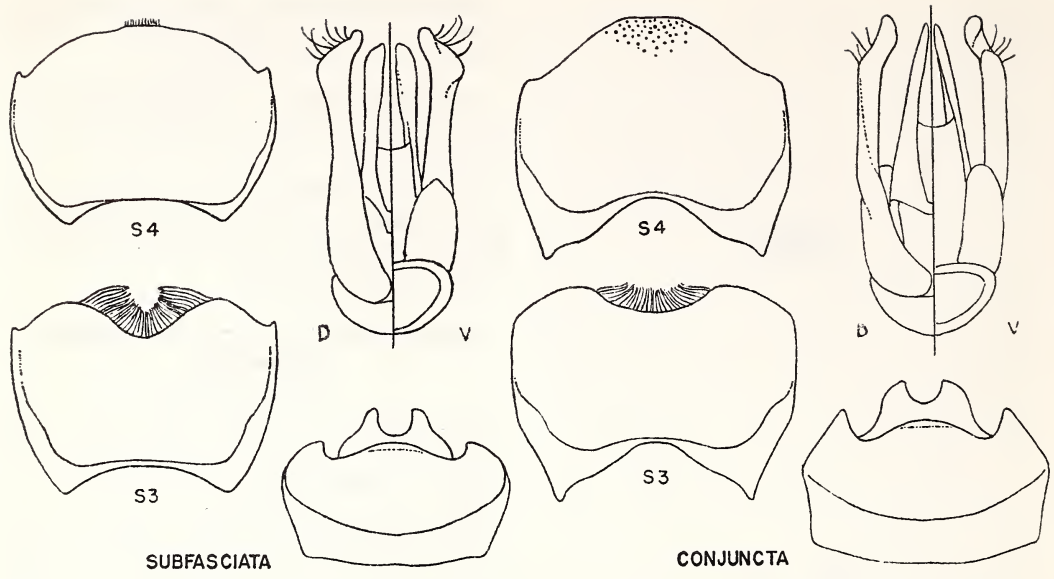


Figure 29—Dorsal and ventral views of genital armature. sterna 3 and 4, and terga 6 and 7 in males of *Osmia conjuncta* and *O. subfasciata*.

culate, on clypeus, front with a distinct nodus midway between antennal fossae, and with a second similar nodus just above this; punctures somewhat finer but close and distinct on cheeks and on scutum anteriorly, becoming somewhat coarser posteriorly, and very coarse and close, but interspaces shining, on scutellum; pleura coarsely, deeply and contiguously punctured; propodeum dull and tessellate, posterior surface with very shallow and obscure punctures, lateral faces practically impunctate, dorsal area densely tessellate but impunctate; abdominal terga somewhat more finely punctate, punctures distinctly separated medially on terga 1-3, becoming closer, deeper and coarser toward sides, more uniformly coarse and close on 4 and 5, very finely and densely punctate on 6, apical margins of all finely and distinctly punctate to the rims.

MALE — Length 9 mm.; abdomen bluish-green, head and thorax more olive green; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, each other, and margin of vertex; clypeus slightly convex, somewhat produced apically, with a shallow, median, apical emargination; length and basal width of labrum about equal; mandibles distinctly bidentate; cheeks considerably broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer its apex than 1st does to base; tarsal segments of legs slender and simple, hind basitarsus without any evident tubercle, mid and hind spurs dark; pubescence entirely yellowish-white; punctures in general deep and distinct, close and coarse on vertex, becoming finer and densely crowded on lower portions of face, on clypeus, and on cheeks below, scutum rather finely and closely punctate anteriorly, becoming somewhat more coarsely so posteriorly, those of scutellum considerably coarser and very close; pleura densely, coarsely and deeply punctate; propodeum rather dull, punctures shallow but evident on both posterior and lateral faces; abdominal terga somewhat more finely punctate, punctures deep, distinct and uniformly quite close, reaching nearly to apical rim of each plate; lateral angles of tergum 6 acute (fig. 29); semicircular median emargination on tergum 7 delimited on each side by rather broadly rounded lobes; sternum 2 very broadly rounded apically, largely covering sternum 3, apical areas of 3 and 4 exposed, form as shown (fig. 29), 5-8 entirely retracted, 5 and 6 but little modified, 7 much reduced, and 8 triangularly pointed medially; gonocoxites rather deeply constricted just before tip.

DISTRIBUTION — Minnesota to Ontario and the New England states, south to Texas and North Carolina, March to August.

FLOWER RECORDS — *Cercis, Dentaria, Fragaria, Geranium, Lupinus* and *Rubus*. Recorded by Robertson (1929) on *Anemonella, Blephilia, Cardamine, Collinsia, Hydrophyllum, Osmorrihiza, Polymonium,*

Psoralea, Ranunculus, Scutellaria, Stellaria, Trifolium and *Viola.*

Rau (1937) has recorded the rearing of *conjuncta* from snail shells.

Osmia (Diceratosmia) subfasciata subfasciata (Cresson)

(Figs. 29 & 32)

Osmia subfasciata Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 261. ♀ ♂.

Osmia conjunctoides Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 276. ♂. New synonymy

Diceratosmia subfasciata Michener, 1947. Amer. Midland Nat. 38, p. 450. (flower record)

Diceratosmia subfasciata subfasciata Michener, 1949. Ent. Soc. Amer. Ann. 42, p. 262.

Osmia (Diceratosmia)subfasciata Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 230.

FEMALE — Length 8 mm.; head and thorax bluish, with a slightly greenish tinge dorsally, abdomen somewhat more greenish; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly closer to eyes; clypeus slightly convex, median area rather abruptly produced apically, this portion nearly straight; median length of labrum about equal to its basal width, somewhat narrowly rounded apically, with a distinct, transverse, median, setose area, otherwise shining and with a row of apical setae; mandibles distinctly tridentate, middle tooth about equally distant from apex and inner angle (fig. 32); cheeks somewhat broader than eyes; front of head not tuberculate; wings lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments of legs simple and unmodified, basitarsi not quite equalling combined length of the following segments, front spurs yellowish-hyaline, mid and hind spurs piceous or black; pubescence, including scopa, entirely white, rather short and thin in general, forming rather distinct, whitish, apical fasciae toward sides on abdominal terga 1 and 2; punctures quite coarse, deep and distinct in general, close on vertex and face above antennae, becoming crowded and quite coarse on clypeus, somewhat finer but close on cheeks and on scutum anteriorly, becoming slightly coarser posteriorly, quite coarse and rather well separated on the shining scutellum; punctures of pleura close and coarse but not crowded, interspaces somewhat shining; propodeum somewhat shining, punctures finer but quite deep, distinct and close, dorsal area becoming finely reticulate along upper margin; punctures of abdominal terga medially rather fine, rather wide separated on 2 and 3, becoming closer and coarser toward sides, uniformly quite close and coarse on 4 and 5, rather fine and densely crowded on 6, punctures reaching apical margin, rims of 2-5 with a single row of very fine and close but deep and distinct punctures.

MALE — Length 7mm.; bluish-green, front of face somewhat more olive green; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, each other, and margin of vertex; clypeus very slightly convex, apical margin rather narrowly produced medially, this area nearly straight, shining and impunctate; median length of labrum about equal to basal width; mandibles distinctly bidentate; cheeks only very slightly broader than eyes; wings faintly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments of legs slender and simple, hind basitarsi without a median denticle, mid and hind spurs piceous; pubescence entirely whitish, dense and erect on clypeus, forming rather distinct, apical fasciae on the more basal abdominal terga, these more or less interrupted medially; punctures deep and distinct, rather coarse in general, coarse on vertex and face above antennae, becoming finer, densely crowded and obscure below antennae and on clypeus, coarse and almost crowded on cheeks; punctures close over most of scutum, somewhat coarser posteriorly, quite coarse and close on scutellum, coarse and almost crowded on pleura; propodeum shining, with rather close and distinct punctures; abdominal terga more finely punctate, rather uniformly close across discs of terga 1-5, somewhat coarser and deeper on 6, close and irregular on 7; lateral angles of tergum 6 rather broadly rounded; median, semicircular emargination of 7 delimited by a pair of rather narrow, blunt processes (fig. 29); sternum 2 broadly rounded apically, largely covering sterna 3 and 4, apical margins of these exposed, form as shown (fig. 29), 5-8 entirely retracted, 5 and 6 but slightly modified, 7 and 8 much reduced, resembling those of *conjuncta;* apex of gonocoxites strongly angulate on outer side, as shown.

DISTRIBUTION—According to Michener (1949), typical *subfasciata* occurs from northern Mexico and Texas to Kansas, and east to Mississippi and Tennessee. He was doubtful of a New Jersey record. It is now known to occur from Florida to North Carolina, and the New Jersey record is probably correct. It is in flight from March to June.

FLOWER RECORDS — *Brassica* and *Rubus*. It is also recorded by Michener (1947 & 1949) on *Achillea, Astragalus, Cercis, Coreopsis, Gaillardia, Helianthus, Marilaunidium, Monarda* and *Prunus*.

This species was found nesting in a house at Waynesville, North Carolina, in burrows of *Hylotrupes bajulus*.

It was at first thought that a dark blue form of *subfasciata* occurring in South Florida represented Robertson's *conjunctoides*. However, the type of *conjunctoides* has been seen and compared with typical *subfasciata* from North Carolina and no differences can be detected. It appears, therefore, that *conjunctoides* is a synonym of *subfasciata*, and the darker blue South Florida form, if it is distinct, should be designated by another name. This, together with the chief differences, follows.

Osmia (Diceratosmia) subfasciata miamiensis
new subspecies

FEMALE — Length 10 mm.; deep blue to purplish; punctures of vertex and dorsum of thorax finer and much closer, being densely crowded on scutum anteriorly; pleura dull, punctures rather coarse but densely crowded, wings somewhat more deeply infuscated.

MALE — Resembles female in color, size and relative density of punctures; terga 6 and 7, and abdominal sterna similar to those in *subfasciata* (fig. 00).

TYPE — Holotype: Female, Cape Florida, Fla., Feb. 15, 1925 (S. Graenicher, on *Crotalaria*.) [author's coll.] Allotype: (head missing), Miami Beach, Fla., Feb. 8, 1917 (Graenicher). Paratypes: 2♀♀, topotypical.

Osmia (Chalcosmia) chalybea Smith
(Figs. 30, 32-35)

Osmia chalybea Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 143. ♀♂.
Osmia chalybea Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 33. ♂.
Chalcosmia chalybea Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 156.
Osmia (Chalcosmia) chalybea Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 16.

FEMALE — Length 14-15 mm.; dark blue; face considerably longer than distance between eyes above; eyes subparallel; lateral ocelli considerably nearer each other than to eyes, widely removed from margin of vertex; apical

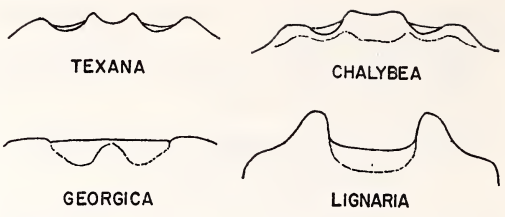


Figure 30
Apical margin of clypeus in females of *Osmia*.

margin of clypeus slightly produced, with a median, elevated, blunt tubercle, depressed area on each side slightly emarginate (fig. 30); labrum with rather copious, black pubescence, its median length somewhat greater than basal width; mandibles rather short and blunt, upper part of base somewhat swollen and with a rounded, carina-like protuberance below, dentate margin with distinct, apical and subapical teeth, and an elongate, beveled area above (fig. 32); cheeks broader than eyes; wings deeply infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified; front spurs testaceous-hyaline, mid and hind spurs piceous; pubescence of head and thorax largely whitish, rather short and dense, pale on the more basal segments of the legs, but becoming black on tarsal segments; scopa entirely black, the abdominal terga with extremely short, inconspicuous, discal pubescence which is barely evident, somewhat more elongate on basal tergum; punctures deep and distinct, quite close in general, rather coarse and distinctly separated on vertex, becoming somewhat closer on cheeks below, densely crowded on face, somewhat coarser and crowded or subreticulate on clypeus; punctures of scutum rather fine and crowded laterally, becoming somewhat coarser and more widely separated along midline, the scutellum with rather sparse and irregular punctures anteriorly, becoming close around posterior margin; pleura dull, with densely crowded punctures, those on lateral faces of propodeum very fine and densely crowded, becoming somewhat more distinctly separated on the tessellate, posterior face, dorsal area dull but smooth, its dorsal margin with short, fine striations; punctures of abdominal terga fine, distinctly but not widely separated medially, becoming almost crowded at extreme sides, those on tergum 5 somewhat coarser and uniformly close, 6 finely and densely punctate, apical margins of all somewhat depressed, well punctured to the rims.

MALE — Length 10-11 mm.; face somewhat longer than distance between eyes above; eyes subparallel; lateral ocelli subequally distant

from eyes and each other, somewhat more distant from margin of vertex; clypeus slightly convex, apical margin slightly produced and outcurved, median area rather narrowly truncate; median length of labrum about equal to basal width; mandibles bidentate; cheeks slightly broader than eyes; wings rather deeply infuscated, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, hind basitarsus with a submedian tubercle on anterior margin; mid and hind spurs fuscous; pubescence of head and thorax entirely, and of legs in large part, whitish, rather short and dense on thorax, becoming somewhat blackish on hind tarsal segments; discal pubescence of basal abdominal tergum entirely whitish, rather elongate, especially laterally, very short and inconspicuous on the following terga, forming rather obscure and indefinite, apical fringes on 4 and 5, entirely pale on apical tergum and on the sterna; punctures quite deep and distinct, rather fine in general, slightly separated on vertex and cheeks, becoming densely crowded on face below ocelli and on clypeus, scutum with densely crowded punctures except along midline posteriorly, those on scutellum somewhat coarser and distinctly separated in center anteriorly, becoming crowded toward posterior and lateral margins; pleura dull, with densely crowded and indefinite punctures, lateral faces of propodeum somewhat shining, punctures very shallow and indistinct, posterior face rather dull, punctures shallow, irregular and rather obscure, dorsal area dark, densely tessellate, with a narrow, dorsal fringe of short striations; punctures of abdominal terga somewhat more distinct but fine, slightly separated medially on 1-3, becoming somewhat closer at extreme sides, uniformly close on 4-6, very fine on 6, apical margins rather narrowly depressed and finely punctate, the punctures becoming obsolescent toward the rims, these shining and impunctate on terga 4 and 5; apical margin of tergum 6 with a distinct, semicircular, median emargination, 7 narrowly produced, this area with a deep semicircular emargination; sternum 2 broadly produced apically, covering most of sternum 3 and basal half of 4, apical margin of 3 with a deep, triangular, median emargination, this area fringed with elongate setae which converge along midline, largely filling the emargination (fig. 33); sternum 4 considerably produced apically, margin slightly thickened and quite deeply grooved (fig. 34), 5-8 entirely retracted, slightly modified; genital armature as shown (fig. 35).

DISTRIBUTION — North Carolina to Florida and Texas, March to May. Sandhouse (1939) includes New York (Long Island) and New Jersey in the distribution.

FLOWER RECORDS — *Ceanothus, Cirsium* and *Vaccinium.*

Osmia (Chalcosmia) coerulescens (Linnaeus)

(Figs. 33-35)

Apis coerulescens Linnaeus, 1758. Syst. Nat. 10th., p. 576. ♀.

Apis aenea Linnaeus, 1761. Fauna Suecica, 2nd. ed., p. 421. ♂.

Osmia cyanea Giraud, 1866. Soc. Ent. France Ann. 6, p. 451. ♀ ♂.

Osmia purpurea Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 27. ♀.

Osmia rustica Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 27. ♂.

Osmia caerulescens Dalla Torre, 1896. Cat. Hym. 10, p. 388. (emend.)

Osmia (Chalcosmia) coerulescens Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 15.

FEMALE — Length 10-11 mm.; dark blue, becoming almost black in some areas; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli slightly nearer each other than eyes, and nearer eyes than to margin of vertex; clypeus strongly convex, apical margin considerably produced, median area straight and simple; labrum slightly longer than basal width; mandible obscurely 4-dentate (resembling that in *albiventris*, fig. 32); cheeks much wider than eyes; wings lightly infuscated, becoming somewhat more deeply so apically, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence pale yellow on face, vertex and dorsum of thorax, whitish on cheeks, thorax laterally and beneath, and on abdomen, the scopa black; punctures quite deep and distinct, rather coarse in general, slightly separated on vertex medially, but becoming crowded on face below ocelli, on clypeus, and over most of cheeks; punctures slightly separated in a restricted area in center of scutum, but otherwise closely crowded on scutum, scutellum and pleura; lateral faces of propodeum somewhat shining, punctures minute and vague, posterior face becoming more shining, punctures shallow and obscure, dorsal area polished, but upper margin becoming narrowly striate; abdominal terga more finely punctate, punctures distinctly separated medially on 1-3, becoming somewhat more deep, distinct and close toward sides, more uniformly close on 4 and 5, very fine and densely crowded on 6, apical margins of all narrowly depressed, but

finely and closely punctate to the rims; pubescence of abdominal terga quite copious, somewhat elongate on basal tergum, short but erect and conspicuous on terga 2-5, these more or less distinctly yellowish fasciate apically, but the fasciae widely interrupted on the more basal terga; tergum 6 with fine, subappressed, pale tomentum.

MALE — Length 9 mm.; brassy green; face somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus strongly convex, somewhat produced apically, median area nearly straight but margin obscurely crenulate; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline, slightly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsi without a submedian tubercle; mid and hind spurs piceous; pubescence yellow on head and thorax above, becoming somewhat more whitish on cheeks and on thorax beneath, copious over abdomen, forming rather indistinct, apical fasciae on the terga; punctures quite deep and distinct, close in general, crowded on face and clypeus, quite uniformly close over remainder of head and thorax, somewhat finer and distinctly separated on abdominal terga 1-4, becoming somewhat closer at extreme sides, rather shallow and indefinite but close on 5, minute and scattered on shining surface of 6, apical margins of all somewhat depressed, yellowish-hyaline, punctures becoming obsolescent; tergum 6 with a small, median, apical emargination, and a shallow and somewhat vague emargination on each extreme side; produced apical area of tergum 7 with a deep, semicircular emargination, acute on each side of this; sternum 2 broadly outcurved apically, covering most of remaining sternal plates, margin of 3 with a broad and deep, triangular, median emargination which is largely filled with elongate setae, converging toward midline (fig. 33); sternum 4 exposed along apical margin, this somewhat thickened and quite deeply grooved (fig. 34), 5-8 entirely retracted, submembraneous; genital armature as shown (fig. 35).

DISTRIBUTION — Minnesota to Nova Scotia, south to Illinois and North Carolina, March to July.

FLOWER RECORDS — *Philadelphus, Salvia, Trifolium* and *Vicia.*

Specimens of *coerulescens* have been reared from cells of an old mud-dauber nest.

Osmia (Chalcosmia) georgica Cresson

(Figs. 30, 34 & 35)

Osmia georgica Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 105. ♀.

Osmia (Gnathosmia) louisianae Cockerell, 1901. Canad. Ent. 42, p. 171. ♀.

Gnathosmia georgica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Chalcosmia) georgica Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 17.

FEMALE — Length 9 mm.; dark blue, with greenish tints on abdominal terga; face very slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; clypeus very short, apical margin hardly produced, with a median, carinate, apical elevation, which does not protrude beyond the apical margin, area on each side rather deeply excavated (fig. 30); labrum rather densely pubescent over upper half and laterally, median length slightly exceeding basal width, subtruncate apically; upper face of mandible with a robust, sub-basal, erect, flared protuberance, which partially covers apical margin of clypeus when mandibles closed, dentate margin with a pair of apical teeth and an inner, more elongate, bevelled edge; cheeks considerably broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence, including scopa, entirely whitish, rather dense over front of face and clypeus, and around wing bases, otherwise thin and inconspicuous; punctures deep and distinct in general, quite coarse and close but not crowded on vertex and cheeks, becoming crowded below ocelli, densely and finely crowded on clypeus; scutum somewhat more sparsely punctate in center of disc, punctures distinct but not widely separated on scutellum; pleura rather dull, with densely crowded punctures, lateral faces of propodeum minutely and densely punctate or subreticulate, posterior face densely tessellate, punctures becoming more irregular and obscure, dorsal area smooth but densely tessellate, becoming narrowly striate along upper margin; punctures rather fine and distinctly but not widely separated on abdominal terga 1-3, becoming finer and closer toward sides, rather uniformly close across 4 and 5, minute and densely crowded on 6, apical margins of all narrowly depressed and very finely punctate to the rims.

MALE — Length 7.5 mm.; deep blue; face

somewhat longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes, each other, and margin of vertex; clypeus only very slightly convex, apical margin slightly produced, nearly straight; median length of labrum approximately equal to basal width; mandibles bidentate; cheeks somewhat broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsi with a very robust, submedian tooth; mid and hind spurs brownish-testaceous; pubescence entirely whitish, rather dense around antennae and over part of face, on cheeks below, on thoracic sternum, with a rather prominant posterior fringe on front and mid femora, elsewhere rather thin and very inconspicuous; punctures quite deep and distinct, very close in general, rather coarse, close and distinct on vertex and cheeks, but becoming densely crowded below ocelli, around antennae and on clypeus; punctures rather coarse and almost crowded over most of scutum and scutellum, pleura dull with densely crowded and rather coarse punctures, but hypoepimeral area just beneath tegulae somewhat shining and more sparsely punctate; lateral faces of propodeum rather dull, punctures shallow and obscure but rather close, posterior face dull and finely tessellate, punctures hardly evident, dorsal area smooth but tessellate, becoming very finely striate along upper margin; punctures of abdominal terga close, deep and distinct, rather coarse on the more basal terga, distinctly but not widely separated on terga 1-3, somewhat closer on 4 and 5, distinctly but not widely separated over most of 6, apical margins of all narrowly depressed, punctures becoming obsolescent toward rims; apical margin of tergum 6 with a small, median emargination, 7 narrowly produced, this area with a deep, rounded emargination; sternum 2 broadly rounded apically, largely covering sternum 3 and base of 4, sternum 3 quite similar to that of *inermis* (fig. 33), 4 rather broadly angulate apically, margin somewhat thickened and deeply grooved (fig. 34); sterna 5-8 entirely retracted; genital armature as shown (fig. 35).

DISTRIBUTION — Massachusetts to Michigan, south to Georgia and Texas, March to August.

FLOWER RECORDS — *Aronia, Brassica, Chrysanthemum, Claytonia, Erigeron, Fragaria, Geranium, Hydrangea, Linaria, Lupinus, Malus, Ranunculus, Rubus, Salix, Senecio* and *Vicia.* It is recorded by Robertson (1929) on *Cardamine, Coreopsis* and *Krigia.*

Osmia (Chalcosmia) texana Cresson

(Fig. 30)

Osmia texana Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 261. ♂.

Osmia mandibularis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 102. ♀.

Osmia faceta Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 103. ♂.

Osmia (Chalcosmia) faceta Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 5, p. 409.

Osmia (Gnathosmia) mandibularis Cockerell, 1903. Ent. News 14, p. 332.

Osmia davidsoniella Cockerell, 1905. Canad. Ent. 37, p. 370. ♂.

Osmia texana Hicks, 1926. Colo. Univ. Studies 15, p. 217. (biology)

Osmia texana Mickel, 1928. Ent. News 39, p. 69. (biology)

Osmia (Chalcosmia) texana Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 20.

FEMALE — Length 12 mm.; dark blue, becoming almost black on vertex and dorsum of thorax; face only slightly longer than distance between eyes above; eyes subparallel; lateral ocelli much nearer to each other than to eyes, much nearer eyes than margin of vertex; clypeus broad and very short, median area strongly convex, apical margin only slightly produced, with an elevated, median, apical protuberance which is somewhat deeply excavated apically, depressed areas on each side very slightly emarginate (fig. 30); labrum with rather copious, black pubescence, its median length slightly greater than basal width; mandibles very similar to those of *chalybea* (fig. 32); width of cheeks nearly twice that of eyes; wings rather lightly infuscated, becoming somewhat more deeply so in marginal cell, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence rather short and inconspicuous, white in large part on head and thorax, somewhat more dense around antennae, on cheeks below, and around wing bases, pale on legs in large part, becoming blackish on hind tarsal segments; scopa entirely black, discal pubescence of abdominal terga very short and inconspicuous, barely visible, entirely pale, becoming rather dense and subappressed on tergum 6; punctures quite deep and distinct, rather coarse and slightly separated on vertex and on scutum toward posterior margin medially, those on scutellum distinctly but not widely separated; pleura rather dull, with rather coarse and close punctures throughout; lateral faces of propodeum, dull, with fine and densely crowded punctures, posterior face more shining, punctures fine and to some degree separated, dorsal area smooth and somewhat

shining, upper margin becoming very narrowly striate; punctures of abdominal terga deep, distinct and well separated on terga 1-4, these becoming rather close toward sides, rather uniformly close across 5, very fine and densely crowded on 6.

MALE—Length 9 mm.; dark blue, becoming almost black on dorsum of thorax; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli nearer each other than to eyes and nearer eyes than to margin of vertex; clypeus broadly convex, apical margin somewhat produced, rather broadly outcurved, median area rather straight; labrum with rather copious pubescence, median length about equal to basal width; mandibles bidentate; cheeks slightly broader than eyes; wings very lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments simple and unmodified, anterior margin of hind basitarsus with a distinct tubercle near apical third; mid and hind spurs piceous, pubescence entirely pale, rather copious and dense on face below ocelli, around wing bases and lateral margins of propodeum, otherwise rather thin and short, discal pubescence of abdominal terga extremely short and inconspicuous, hardly evident, but tending to form thin and very obscure, apical fasciae on terga 4 and 5; punctures rather deep and distinct, slightly separated on vertex, becoming densely crowded below ocelli, rather coarse and distinct on cheeks below, rather fine and densely crowded over most of scutum, punctures of scutellum somewhat coarser and distinctly separated, interspaces shining; pleura dull, with densely crowded punctures, these becoming slightly more coarse and distinct just below tegulae; propodeum somewhat shining, punctures fine, irregular and obscure on lateral faces, finer and more distinctly separated on posterior face, dorsal area dull above, margin narrowly striate; sternum 2 broadly produced apically, slightly emarginate medially, largely covering 3 and 4, apical margin of 3 rather broadly emarginate, this area occupied by elongate setae which converge along midline, apical margin of 4 slightly thickened and rather deeply grooved, 5-8 entirely retracted, submembranous; genital armature much as in *chalybea* (see fig. 35).

DISTRIBUTION — This is primarily western, ranging from British Columbia and California to North Dakota and Texas. Collections have also been made in the East, with positive records in Michigan, New York and Florida, May to August, but as early as March in Florida.

Osmia (Nothosmia) albiventris Cresson

(Figs. 32, 33 & 35)

Osmia albiventris Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 31. ♀ ♂.

Leucosmia albiventris Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171.

Leucosmia albiventris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) albiventris Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 117.

FEMALE — Length 8 mm.; bluish-green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly more removed from eye; clypeus broadly convex, considerably produced apically, median area of margin nearly straight; median length of labrum considerably less than basal width; mandibles obscurely 4-dentate, as shown (fig. 32); cheeks somewhat broader than eyes; wings subhyaline, very lightly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments simple and unmodified; mid and hind spurs piceous; pubescence entirely pale, yellowish-white above, becoming more whitish below, and scopa entirely white; discal pubescence of abdominal terga very short and inconspicuous, forming rather loose and indefinite, apical fasciae at sides of 2 and 3 and across entire width of 4 and 5, 6 rather densely covered with subappressed, pale tomentum; punctures deep and distinct, rather fine and close in general, quite uniform over most of head, somewhat more distinctly separated in center of scutum posteriorly, and scutellum with a narrow, impunctate, median line, punctures on each side deep, distinct and quite close; pleura rather dull, punctures rather shallow but closely crowded, becoming slightly separated just beneath tegulae; lateral faces of propodeum somewhat shining, but very finely roughened, posterior face dull, with shallow, indefinite, obscure but rather close punctures, dorsal area rather velvety, but becoming rather broadly and finely striate along upper margin; punctures of abdominal terga deep, distinct and fine but well separated on terga 1-3, becoming somewhat coarser but still slightly separated at extreme sides, rather uniformly close across 4 and 5, very fine and densely crowded on 6, apical margins only slightly depressed, finely and rather sparsely punctate nearly to the rims.

MALE — Length 8-9 mm.; bluish-green; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from mar-

gin of vertex and each other, slightly more distant from eyes; clypeus broadly convex, somewhat produced apically, the narrow, median area of margin smooth and shining, impunctate, nearly straight; mandibles bidentate; cheeks somewhat broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender, simple and unmodified, anterior margin of hind basitarsus with a very low, subapical tubercle or angle; mid spurs brownish- testaceous, hind spurs more fuscous; pubescence entirely whitish, rather copious on face, cheeks below, over most of thorax, and on front and middle legs; punctures quite deep and distinct, rather close but not crowded on vertex and cheeks, and on face between antennae and ocelli, becoming densely crowded below antennae and over clypeus; punctures of scutum quite close but not crowded, slightly separated in center of disc, scutellum with a very narrow, median, impunctate line, otherwise closely punctate; punctures of pleura almost crowded; lateral faces of propodeum rather smooth but minutely roughened, the metapleura largely shining and impunctate, posterior face of propodeum rather dull and tessellate, punctures vague and obscure, dorsal area velvety, margin becoming very finely striate; abdominal terga shining, punctures quite deep and distinct, rather coarse and well separated toward basal margin of each tergum, becoming rather fine and irregular toward the depressed, shining and impunctate apical rims, punctures of 5 more uniformly distributed, slightly separated, those on 6 rather distinct, close at base, but becoming sparse, minute and irregular apically; tergum 6 with a shallow, median emargination, 7 quite broad and short, the median, apical emargination very shallow and obscure, hardly evident; sternum 2 largely covering 3 and 4, apical margin broadly outcurved, narrowly yellowish-hyaline, 3 with a rather narrow, median, triangular emargination which is largely filled with converging setae (fig. 33), 4 slightly produced medially toward apex, this area sparsely clothed with elongate, recurved setae, 5-8 entirely retracted, 8 broadly rounded apically, apex very narrowly emarginate medially; genital armature as shown (fig. 35).

DISTRIBUTION — Minnesota to Quebec and the New England states, south to Georgia, April to August.

FLOWER RECORDS — *Brassica, Geranium, Malus, Pentstemon, Rubus, Trifolium* and *Vicia.* This is recorded by Robertson (1929) on *Gillenia.*

Osmia (Nothosmia) cordata Robertson
(Figs. 32 & 33)

Osmia cordata Robertson, 1902. Ent. News 13, p. 79. ♂.
Osmia hesperella Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 227. ♀
Osmia coloradella Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 229. ♀.
Osmia ramaleyi Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 126. ♂ ♀.
Osmia hesperella Cockerell, 1911. Canad. Ent. 43, p. 389.
Stelidae Turner, 1911. Jour. Anim. Behavior 1, p. 374. (biology)
Osmia cordata Rau, 1916. Jour. Anim. Behavior 6, p. 37. (biology)
Osmia cordata Rau, 1923. Ent. News. 34, p. 308. (biology)
Osmia cordata Rau, 1928. Acad. Sci. St. Louis, Trans. 25, p. 363. (biology)
Osmia cordata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Osmia figginsi Cockerell, 1935. Amer. Mus. Novitates 766, p. 2. ♂.
Osmia cordata Rau, 1937. Ent. Soc. Amer. Ann. 30, p. 324. (biology)
Osmia (Nothosmia) cordata Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 110.
Osmia cordata Chandler, 1958. Indiana Acad. Sci. 68, pp. 199-204. (biology)

FEMALE — Length 11 mm.; blue-green; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, from posterior margin of vertex and from each other; clypeus broadly convex and quite broadly produced apically, the wide, median area nearly straight; median length of labrum about equal to basal width; dentition of mandible as shown (fig. 32); cheeks considerably broader than eyes; wings subhyaline, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence, including scopa, entirely pale, rather short and thin but somewhat more copious around antennae, on cheeks below, around wing bases, on propodeum and basal abdominal tergum, very short on discs of the following terga, becoming subappressed on tergum 6; punctures rather fine and close but deep and distinct over most of head and thorax, densely crowded on face and clypeus, on cheeks and pleura, slightly separated in center of scutum but otherwise contiguous, and contiguous in large part on scutellum; lateral and posterior faces of propodeum somewhat shining but with minute, densely crowded, shallow punctures, dorsal

area velvety, becoming finely striate along upper margin; abdominal terga shining, punctures finer and distinctly separated on 1-3 medially, but these becoming closely punctate at sides, 4 and 5 uniformly, closely punctate, and 6 minutely and densely punctate, apical margins of all only slightly depressed, apical rims narrowly shining and impunctate.

MALE — Length 9-10 mm.; head and thorax dark olive-green, abdomen more bluish-green; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus very slightly convex, considerably produced apically, median area nearly straight but finely crenulate, margin narrowly shining and impunctate; median length of labrum about equal to basal width; mandibles distinctly bidentate; cheeks subequal to eyes in width; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsus with a very small tubercle near apical third, mid and hind spurs piceous; pubescence entirely white, dense around antennae, over lower portion of face and on cheeks below, quite copious over most of thorax and on basal abdominal tergum, shorter but erect on the following terga; punctures fine and densely crowded over most of head and thorax, but becoming somewhat more coarse and distinct on scutellum, very shallow and indistinct on lateral and posterior faces of propodeum, dorsal area velvety, becoming very finely and irregularly striate along upper margin; abdominal terga shining, punctures fine and definitely but not widely separated medially, becoming somewhat coarser and closer toward sides, terga 4-6 more uniformly finely and closely punctate, 6 becoming impunctate along the brownish apical margin, this broadly and shallowly emarginate medially, 7 narrowly produced medially, with a deep, semicircular emargination, the two resulting projections slender and acute; sternum 2 broadly rounded apically, covering 3 and most of 4, apical margin of 3 with a quite deep, triangular, median emargination which is largely filled with elongate, converging setae (fig. 33), 4 rather broadly outcurved apically, median area rather finely setose, and with a very fine, median, impunctate line, the margin not thickened; sterna 5-8 entirely retracted, submembranous, 8 broadly triangular apically; genital armature much as in *collinsiae* (fig. 35), but pubescence not quite as elongate.

DISTRIBUTION — North Dakota, Colorado and New Mexico, east to Ohio, March to June.

FLOWER RECORDS — *Salvia* and *Verbena.* This is recorded by Robertson (1929) on *Aesculus, Cardamine, Lithospermum, Pentstemon, Phlox, Rubus* and *Trifolium.*

This species has been reared from cells of *Scelifron caementarium.*

Osmia (Nothosmia) distincta Cresson

(Figs. 31-33)

Osmia distincta Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 30. ♀.

Monilosmia canadensis Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171.

Osmia distincta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) distincta Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 75.

FEMALE — Length 9 mm.; blue; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus convex, considerably produced apically, median area broadly incurved, margin narrowly shining and impunctate; median length of labrum about equal to basal width; dentition of mandible as shown (fig. 32); cheeks slightly broader than eyes; wings subhyaline, apical margin becoming lightly but abruptly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, that on abdomen, including scopa, white, the interocellar area with a distinct row of elongate, downcurved hairs which meet a strong tuft of suberect, pale hairs between antennae, those on clypeus downcurved, resulting in a pattern peculiar to this species; pubescence of basal abdominal tergum rather long and copious, quite short but erect and clearly evident on discs of the following terga, that on 6 subappressed and very short; hypostomal carinae angulate opposite apex of labrum; punctures rather fine and close in general, but deep and distinct, close over most of head, face rather coarsely rugose below ocelli; scutum and scutellum shining, punctures close except across posterior half of scutum, quite distinct but close on scutellum; pleura rather dull, with subcontiguous, rather shallow punctures; lateral faces of propodeum somewhat smoother but with close, minute punctures, these becoming very obscure on posterior face, dorsal area velvety, upper margin very narrowly and irregularly striate; abdominal terga shining, punctures fine, quite close but slightly separated medially on 1-5, becoming quite close at extreme sides, uni-

formly, densely crowded on 6, apical margins slightly and narrowly depressed, finely and closely punctate nearly to the rims.

MALE — Length 7-8 mm.; head and thorax dark olive-green, abdomen somewhat more bluish-green; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus convex, apical margin somewhat produced, nearly straight, narrowly shining and impunctate medially; labrum about as long as basal width; mandibles distinctly bidentate; cheeks subequal to eyes in width; wings subhyaline, faintly clouded apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a very low, submedian tubercle, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, that of abdomen more distinctly white, quite copious on lower half of face, on cheeks, over most of thorax, and to some degree on basal abdominal tergum; punctures quite deep and distinct, rather close and coarse in general, becoming rather fine and densely crowded around antennae and over lower portion of face, shallow but subcontiguous of cheeks below, subcontiguous over most of scutum but becoming slightly separated medially toward posterior margin, those on scutellum distinctly but not widely separated, quite coarse and deep; pleura dull, with rather shallow, subcontiguous punctures, these slightly separated just below wing bases; lateral faces of propodeum rather dull, surface finely roughened but hardly punctate, posterior face rather dull and obscurely roughened, dorsal area velvety, upper margin rather broadly and finely striate; abdominal terga shining, punctures rather fine and close basally, becoming somewhat more distinctly separated apically, margins rather broadly depressed, invaded by punctures nearly to the narrowly shining and impunctate rims; tergum 6 with a rather shallow but distinct median apical emargination, 7 narrowly produced medially, deeply emarginate, the two resulting projections acutely triangular; sternum 2 broadly outcurved apically, margin rather narrowly yellowish-hyaline, smooth and impunctate, largely covering sternum 3 and base of 4, 3 broadly incurved apically, median area occupied by a tuft of convergent setae (fig. 33), 4 rather broadly produced medially, this area rather densely setose and with a narrow, median, non-setose line; sterna 5-8 retracted, submembranous, 8 triangularly pointed apically; genital armature resembling that of *albiventris*, (fig. 35), apex of gonocoxite as shown (fig. 31).

DISTRIBUTION — North Dakota to Ontario and the New England states, south to Colorado, Tennessee and North Carolina, March to July.

FLOWER RECORDS — *Pentstemon, Rubus* and *Trifolium*. Additional records by Robertson (1929) include *Blephilia, Dianthera, Gillenia, Hypoxis* and *Lithospermum*.

Osmia (Nothosmia) inspergens Lovell and Cockerell

(Figs. 33-35)

Osmia inspergens Lovell and Cockerell, 1907. Psyche 14, p. 17. ♀.

Osmia (Nothosmia) inspergens Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 88.

FEMALE—Length 10 mm.; dark bluish, becoming almost black in some areas; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from each other and margin of vertex, very slightly more distant from eyes; clypeus convex but strongly produced apically, median area of margin nearly straight, very narrowly polished and impunctate; labrum short, not much more than half as long as basal width; mandibles much broadened apically, dentition much as in *albiventris* (fig. 32); cheeks considerably broader than eyes; wings very lightly infuscated, becoming somewhat darker apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; front basitarsi somewhat flattened, posterior surface somewhat concave, fringed with elongate, white hairs; mid and hind spurs piceous; pubescence of head and thorax largely yellowish-white, but clypeus with a subapical, rather dense brush of fuscous hairs; pubescence quite long and copious over most of thorax, elongate and white on basal abdominal tergum, discal pubescence of the following terga erect, entirely white, rather thin and inconspicuous, that on tergum 6 subappressed and silvery, scopa entirely yellowish-white; punctures deep and distinct in general, rather well separated but not sparse on vertex, becoming quite close but not crowded below ocelli and along sides of face, close, deep and distinct on clypeus, but this with a median, triangular, shining and impunctate area on upper margin; scutum and scutellum shining, punctures close but not crowded, becoming rather sparse in center of scutum and in midline of scutellum, pleura rather dull, with densely crowded, shallow punctures, lateral faces of propodeum somewhat smoother but finely roughened, posterior face dull, more tessellate, dorsal area velvety, becoming very

finely and obscurely substriate along upper margin; abdominal terga shining, punctures fine but rather close and deep, becoming somewhat closer at extreme sides, apical margins rather narrowly depressed but well punctured nearly to the rims, tergum 6 very finely and densely punctate.

MALE — Length 9-10 mm.; bluish-green, with dorsum of head and thorax somewhat more olive-green; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distance from eyes and each other, slightly nearer margin of vertex; clypeus convex, apical margin somewhat produced, median area nearly straight, narrowly polished and impunctate; median length of labrum about equal to its basal width; mandibles bidentate; cheeks slightly broader than eyes; wings subhyaline basally, becoming very faintly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsus without a definite tubercle, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, quite copious over face and cheeks and over most of thorax, basal abdominal tergum with copious, more whitish pubescence, discal pubescence of following terga very short and inconspicuous but erect and evident; punctures rather deep and distinct, rather fine and close in general, close but not crowded on vertex and dorsum of thorax, becoming densely crowded on face below, on cheeks and on pleura, lateral faces of propodeum smooth but rather dull, minutely and closely punctate, posterior face more tessellate, punctures close but obscure, dorsal area velvety, becoming very narrowly and irregularly striate along upper margin; abdominal terga smooth and shining, punctures fine and quite close, but not crowded, apical margins rather narrowly depressed, these areas invaded in part by very fine and scattered punctures, only the narrow rims impunctate; tergum 6 rather sparsely punctate and shining, with a small, median, apical emargination, 7 quite broad, rather broadly produced medially, with a deep, narrow, median emargination; sternum 2 broadly outcurved apically, largely covering 3 and base of 4, 3 with a deep, triangular, median emargination which is fringed with short setae which do not converge medially (fig. 33); sternum 4 rather broadly produced apically, this area quite strongly incurved and slightly thickened (fig. 34); 5-8 entirely retracted, submembraneous, apical margin of 8 somewhat narrowly rounded apically; genital armature as shown (fig. 35).

DISTRIBUTION — Quebec and Maine to Georgia, April to June.

FLOWER RECORDS — *Baptisia, Polycodium, Trifolium* and *Vaccinium.*

Osmia (Nothosmia) michiganensis new species

(Fig. 35)

MALE—Length 7.5 mm.; dark bluish-green, becoming somewhat more greenish on upper part of face and dorsum of thorax; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli slightly nearer each other than to eyes, and slightly nearer margin of vertex than to each other; clypeus convex, apical margin considerably produced, the broad, median area nearly straight, narrowly shining and impunctate; median length of labrum about equal to its basal width, rather broadly rounded; mandibles bidentate; cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated toward apical margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments slender and simple, hind basitarsi not tuberculate anteriorly, mid and hind spurs piceous; pubescence entirely pale, quite copious and elongate over face, vertex, dorsum of thorax and basal abdominal tergum, discs of the following terga with erect but short and thin, pale pubescence which is very inconspicuous, with no dark hairs in evidence; punctures quite deep and distinct in general, close but not crowded on vertex and cheeks, becoming rather densely crowded and coarse just below ocelli and between antennae, fine and densely crowded on clypeus; punctures close but not crowded over most of scutum, those on scutellum slightly more separated but still quite close, with a narrow, median, impunctate line, posterior margin very finely and densely punctate; pleura somewhat shining above, but punctures shallow and quite close in general; lateral faces of propodeum somewhat smoother but rather dull, posterior face somewhat more coarsely roughened, dorsal area dull and densely tessellate although smooth, becoming very obscurely sub-striate along upper margin; abdominal terga shining, punctures rather coarse toward base of each tergum, becoming somewhat finer and more sparse toward the depressed apical margins, these invaded by punctures, but apical half of each smooth, shining and impunctate; punctures of tergum 6 rather widely separated but quite uniform, evenly distributed, apical margin with a narrow, but very deep, rounded, median emargination; tergum 7 narrowly produced and with

a deep, rounded, median emargination; sternum 2 rather broadly outcurved, covering basal half of 3, this with a broad, rounded, median emargination which is filled with a row of rather short setae which do not markedly converge medially; sternum 4 rather broadly produced apically, rather evenly beset across entire width with very fine setae, these somewhat elongate across median, apical area; sterna 5-8 entirely retracted; apices of gonocoxites slightly thickened and flexed at tip, much exceeding penis valves in length (fig. 35).

TYPE — Holotype — Male, Grand Traverse Co., Mich., May 27, 1950 (R. R. Dreisbach) [author's coll.].

Osmia (Nothosmia) pumila Cresson

(Figs. 31, 33 & 34)

Osmia pumila Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 35. ♀.
Osmia vicina Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 38. ♂.
Osmia pumila Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Osmia pumila (!) Pearson, 1933. Ecol. Monogr. 3, p. 381.
Osmia (Nothosmia) pumila Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 126.

FEMALE—Length 8 mm.; blue, legs mostly black; face somewhat longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, very slightly nearer margin of vertex; clypeus convex, considerably produced apically, margin nearly straight medially, narrowly smooth and impunctate; median length of labrum about equal to its basal width; mandibles obscurely 4-dentate (much as in *cordata*, fig. 32); cheeks subequal to eyes in width; wings hyaline basally, becoming lightly infuscated along apical margin, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax yellowish-white above, becoming more whitish below, rather long but thin, not hiding surface, somewhat more copious around wing bases; scopa entirely white, pubescence of basal abdominal tergum entirely white, rather elongate, discal pubescence of the following terga very short and thin but erect, entirely white, tending to form whitish, apical fringes on the more apical terga; tergum 6 with rather dense, subappressed, whitish pubescence; punctures in general quite coarse, deep and distinct, close over most of head, becoming crowded between antennae and eyes, very coarse and deep on upper portion of clypeus, becoming somewhat more fine and shallow apically; scutum closely punctate anteriorly and laterally, becoming rather sparsely punctate in center of disc, punctures of scutellum distinctly but not widely separated, with a narrow, median, impunctate line; pleura dull, punctures subcontiguous, rather shallow; lateral faces of propodeum dull, very finely reticulate, posterior face becoming more tessellate, with shallow, obscure, scattered punctures, dorsal area more velvety, upper margin rather broadly but very finely substriate; punctures of abdominal terga fine and well separated on 2 and 3 medially, becoming somewhat coarser and closer at each side, basal tergum rather coarsely punctate across base and at sides, becoming more finely but still closely punctate medially, punctures of 4 and 5 somewhat more coarse and irregular, slightly but not widely separated, 6 with dense, fine, crowded punctures, apical margins of terga only faintly depressed, punctures fine and evenly distributed, nearly or quite reaching apical rims.

MALE—Length 7-8 mm.; bluish-green; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, from each other, and from margin of vertex; clypeus convex, considerably produced apically, margin very slightly outcurved, narrowly shining and impunctate; median length of labrum considerably less than basal width; mandible bidentate; cheeks slightly narrower than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base; basal segments of legs with metallic reflections, otherwise black, tarsal segments slender and simple, anterior margin of hind basitarsus with a fine, submedian tubercle, mid and hind spurs piceous; pubescence of head and thorax yellowish-white, rather copious and erect on face, vertex and dorsum of thorax, elongate on basal abdominal tergum, discs of the following terga with very thin, short, erect, entirely pale pubescence, tending to form obscure, pale fringes on the more apical terga; punctures in general quite deep and distinct, rather fine, close over most of head, becoming densely crowded below ocelli, between and around antennae, and over most of clypeus; punctures close but not crowded over most of scutum, becoming rather dense around anterior and lateral margins, close but distinct on scutellum, but becoming densely crowded and obscure around posterior margin, subcontiguous on pleura, but this somewhat shining, the metapleura shining and largely impunctate; lateral faces of propodeum dull and tessellate or subreticulate, posterior face tessellate, with shallow, obscure, scattered punctures, dorsal area densely tessel-

late, becoming very finely and irregularly substriate along upper margin; abdominal terga shining, punctures fine and distinctly separated medially on 2-4, rather coarse across base of 1, these becoming more closely and deeply punctate toward sides, apical margins rather broadly impressed, invaded by very fine and rather well separated punctures, the rims only narrowly shining and impunctate, punctures of 5 and 6 rather irregular, more or less separated, becoming rather sparse across apical portion of 6; apical margin of tergum 6 with a shallow, median emargination, 7 somewhat produced medially, with a shallow, median emargination; sternum 2 broadly outcurved apically, largely covering 3 and basal portion of 4, 3 with a rather narrow, median emargination, this with a fringe of rather short, converging hairs which do not meet medially (fig. 33); apical margin of sternum 4 broadly outcurved, surface rather finely and evenly setose (fig. 34), 5-8 entirely retracted, submembraneous; genital armature resembling that of *albiventris* (fig. 35), apex of gonocoxite as shown (fig. 31).

DISTRIBUTION — Minnesota to Quebec and the New England states, south to Georgia, April to July.

FLOWER RECORDS — *Barbarea, Claytonia, Crataegus, Geranium, Houstonia, Malus, Melilotus, Pedicularis, Pentstemon, Rubus, Taraxacum, Trifolium, Vaccinium, Viburnum* and *Vicia*. This has been recorded by Robertson (1929) on the following: *Anemonella, Antennaria, Arabis, Astragalus, Camassia, Cardamine, Cercis, Chaerophyllum, Collinsia, Comandra, Cornus, Dentaria, Diospyros, Ellisia, Erigenia, Erythronium, Fragaria, Isopyrum, Krigia, Malva, Mertensia, Nepeta, Oxalis, Polemonium, Potentilla, Ranunculus, Ribes, Rosa, Salix, Sassafras, Scutellaria, Sisyrinchium, Smilax, Viola, Zanthoxylum* and *Zizia*.

Osmia (Nothosmia) sandhouseae Mitchell

(Fig. 31)

Osmia albohirta Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 164. ♀. (preocc.)
Osmia sandhouseae Mitchell, 1927. Psyche 34, p. 178. (new name)
Osmia (Nothosmia) sandhouseae Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 119.
Osmia (Nothosmia) sandhouseae Michener, 1947. Amer. Midland Nat. 38, p. 450. (flower record)

FEMALE—Length 9-10 mm.; dark blue, with blackish legs; face slightly longer than

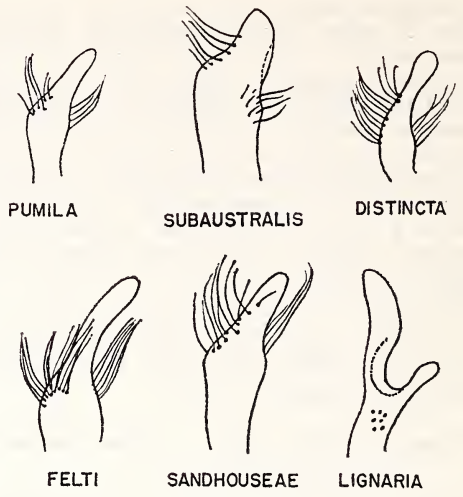


Figure 31
Gonostylus of genital armature in males of *Osmia*.

distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer to each other; clypeus convex, considerably produced apically, the broad margin nearly straight, very narrowly shining and substriate; median length of labrum about equal to basal width; mandibles 3-dentate (fig. 32); cheeks slightly broader than eyes; wings subhyaline basally, becoming lightly infuscated along apical margin, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence entirely pale, rather short and thin in general, but more dense around antennae and wing bases, elongate on basal abdominal tergum, but very short, erect, entirely pale on discs of the following terga, becoming subappressed on tergum 6, scopa entirely white; punctures quite coarse, deep and distinct on vertex, only slightly separated, becoming finer and crowded on sides of face below, rather coarse and subcontiguous on clypeus, densely crowded on cheeks; punctures rather coarse and densely crowded over most of scutum and scutellum, pleura dull, punctures rather shallow, but contiguous throughout; lateral faces of propodeum somewhat shining, punctures hardly evident, posterior face tessellate, with scattered, shallow and obscure punctures, dorsal area more velvety, becoming very finely and obscurely substriate along upper margin; abdominal terga shining, punctures fine, rather close in large part, being only slightly separated in median area of the more basal terga, punctures becoming somewhat more coarse on 4 and 5, very fine

and densely crowded over 6, apical margins very slightly depressed, finely punctate nearly to the rims.

MALE—Length 7-8 mm.; bluish-green; face slightly longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus convex, considerably produced apically, apical margin nearly straight, with a sharply defined, polished, impunctate area; median length of labrum subequal to its basal width; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline, slightly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments simple and unmodified, anterior margin of hind basitarsus with a low, triangular tubercle near apical third, mid and hind spurs piceous; pubescence entirely whitish or rather strongly yellowish, quite copious over face, cheeks below, entire thorax and basal segment of abdomen, short but rather dense and erect on discs of terga 2-5, tending to form obscure, apical fringes on the more apical terga; punctures quite deep and distinct, slightly separated on vertex, becoming densely crowded below ocelli, very fine and dense on supraclypeal area and clypeus, shallow and rather coarse and irregular on cheeks; punctures rather fine and densely crowded on scutum anteriorly, becoming somewhat coarser posteriorly, but uniformly close, those on scutellum coarse, more distinct anteriorly, but becoming densely crowded around margin; pleura with subcontiguous, shallow punctures throughout, lateral faces of propodeum rather smooth and somewhat shining, posterior face dull and tessellate, with scattered, minute, shallow and obscure punctures, dorsal area more velvety, becoming very obscurely and finely substriate along upper margin; abdominal terga shining, punctures quite deep and distinct, only slightly separated medially on terga 1-3, more uniformly close across 4 and 5, 6 shining, with scattered, sparse, shallow and obscure punctures, apical margins of all shallowly depressed, rather evenly and finely punctate except on the very narrow, apical rims; apical margin of tergum 6 with a rather broad, shallow, median emargination, 7 produced medially, with a deep, subtriangular emargination, resulting in a pair of subacute, triangular lobes; sternum 2 broadly outcurved apically, covering sternum 3 in large part, and base of 4, apical margin of 3 with a deep, median emargination, this largely filled with long, convergent setae (fig. 33), apical margin of 4 broadly outcurved, surface finely and quite uniformly setose across entire breadth, but median setae more elongate (fig. 34), 5-8 entirely retracted, submembraneous; penis valves of genital armature only slightly exceeded by the gonostyli, apex of gonostylus as shown (fig. 31).

DISTRIBUTION—New York and the New England states, south to Florida and Texas, February (in Florida) to June.

FLOWER RECORDS—*Claytonia, Crataegus, Fragaria, Geranium, Ilex, Iris, Linaria, Lupinus, Oenothera, Pedicularia, Pentstemon, Polycodium, Rubus, Tephrosia, Toxicodendron, Trifolium, Vaccinium* and *Vicia.* Michener (1947) records *sandhouseae* on *Astragalus* and *Gaylussacia.*

Osmia (Chenosmia) atriventris Cresson

(Figs. 32, 33 & 35)

Osmia atriventris Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 29. ♀.

Osmia atriventris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) atriventris Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 124.

Osmia (Chenosmia) atriventris Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 8 mm.; blue-green; face very slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; clypeus rather strongly convex, considerably produced apically, median area of margin nearly straight, narrowly impunctate and somewhat shining; median length of labrum approximately equal to basal width; mandibles 3-dentate, as shown (fig. 32); cheeks considerably broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; scopa black, pubescence otherwise largely pale, thin but rather elongate on face, cheeks below, dorsum of thorax, pleura and basal abdominal tergum, very thin, rather short and inconspicuous on terga 2-5, short, thin and subappressed, but not hiding surface on 6; punctures deep and distinct, quite close and coarse in general, slightly separated on each side of vertex, but otherwise nearly or quite contiguous over entire head; punctures quite coarse over most of scutum and scutellum, slightly separated in center of scutum posteriorly and on midline of scutellum; pleura dull, punctures shallow but contiguous; lateral faces of propodeum rather dull, very finely roughened or subreticulate, posterior face dull, densely tessellate, with scattered, obscure punc-

tures, dorsal area velvety, becoming narrowly striate along upper margin; abdominal terga shining, punctures rather fine and distinctly separated, somewhat closer toward base, but becoming well separated toward apical margin of each plate, becoming quite close at each extreme side, apical margins only very slightly depressed, this area invaded by fine, scattered punctures which do not reach the apical rims.

MALE — Length 7-8 mm.; dark bluish-green; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, slightly more distant from eyes; clypeus rather strongly convex, somewhat produced apically, median area of margin nearly straight, vaguely crenulate, narrowly shining and impunctate; median length of labrum approximately equal to basal width; mandibles bidentate; cheeks about equal to eyes in width; wings subhyaline, recurrent veins reaching 2nd submarginal cell rather distant from base and apex, these spaces about equal; tarsal segments of legs slender and simple, unmodified, hind basitarsus with a very low, anterior tubercle near apical third, mid and hind spurs brownish or piceous; pubescence entirely pale, rather copious but thin over most of head and thorax, quite elongate on thorax dorsally and laterally, very thin and inconspicuous on abdominal terga; punctures deep and distinct, rather coarse and quite close in general, close but distinct on cheeks, vertex and upper part of face, becoming densely crowded and very fine on clypeus; scutum and scutellum shining, punctures distinct but not crowded, scutellum with a median, narrow, impunctate line; pleura dull, punctures shallow but contiguous, almost crowded; lateral faces of propodeum smooth but rather dull, punctures vague and indefinite, posterior face more densely tessellate, with closer but obscure punctures, dorsal area dull and velvety, becoming narrowly striate along upper margin; abdominal terga more shining, median punctures rather fine and slightly separated, becoming slightly closer toward sides, rather uniformly distributed on 4 and 5, 6 rather closely and shallowly punctate across base, but punctures becoming fine, sparse and indefinite apically, margins of terga shallowly but rather broadly depressed, invaded by fine punctures which do not attain apical rims; tergum 6 with a small, median, semicircular emargination, 7 narrowly produced medially, with a deep, semicircular emargination; sternum 2 broadly rounded apically, margin yellowish-hyaline, covering in large part sterna 3 and 4, 3 with a narrow, median, triangular emargination which is entirely filled with elongate, converging setae (fig. 33); 4 somewhat produced apically across median third, this area quite densely setose, 5-8 entirely retracted, 6 with a rounded, median, apical lobe; genital armature as shown (fig. 35).

DISTRIBUTION — Alberta to Nova Scotia, south to Iowa, Tennessee and Georgia, April to July.

FLOWER RECORDS — *Barbarea, Cercis, Chrysanthemum, Geranium, Hydrangea, Rubus, Trifolium, Vaccinium, Vicia* and *Viola.* This is recorded by Robertson (1929) on *Arabis, Astragalus, Cardamine, Claytonia, Collinsia, Ellisia, Erigenia, Fragaria, Gillenia, Hypoxis, Lithospermum, Mertensia, Nothoscordum, Pentstemon, Polymonium, Psoralea, Uvularia* and *Zizia.*

Osmia (Chenosmia) collinsiae Robertson

(Figs. 32-35)

Osmia major Robertson, 1902. Ent. News 13, p. 79. ♂ (not ♀).

Osmia collinsiae Robertson, 1905. Canad. Ent. 37, p. 236. ♂.

Osmia collinsiae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) collinsiae Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 121.

Osmia (Chenosmia) collinsiae Sinha, 1958. Univ. Kansas. Sci. Bul. 39, p. 235.

FEMALE — Length 11 mm.; deep blue; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, much nearer to each other; clypeus broadly convex, considerably produced apically, median area of margin nearly straight, narrowly shining and impunctate; labrum very slightly longer than basal width; mandibles obscurely 4-dentate, as shown (fig. 32); cheeks somewhat broader than eyes; wings lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments of legs simple and unmodified, mid and hind spurs piceous; pubescence largely fuscous and quite dense on clypeus, becoming whitish between antennae and eyes but with intermixed light and dark hairs around ocelli and on vertex; scutum with largely pale pubescence, but with scattered, erect, fuscous hairs, that on pleura, scutellum and propodeum entirely yellowish-white; pubescence of legs largely pale basally, but becoming fuscous on the more apical segments; basal abdominal tergum with elongate, whitish pubescence, this becoming shorter on the following terga, pale on 2, fuscous and erect on 3-5, 6 with sub-

appressed, thin tomentum which does not obscure the surface; scopa entirely black; punctures deep, distinct and rather close in general, slightly separated behind ocelli, but deep and distinct, becoming quite closely crowded and finer on face below, especially on clypeus, fine, close and rather shallow on cheeks below; densely crowded over much of scutum but becoming slightly separated in center of disc posteriorly, slightly separated, in part, on scutellum, pleura dull with shallow and contiguous punctures; lateral faces of propodeum somewhat shining, but rather minutely roughened, posterior face becoming rather densely tessellate and with minute and obscure punctures, dorsal area velvety, becoming very obscurely and narrowly substriate along upper margin; abdominal terga more shining, punctures fine, quite close but distinctly separated in center of terga 1-6, becoming very close at extreme sides, minute and densely crowded on 6, apical margins narrowly depressed, shining and impunctate.

MALE — Length 8-9 mm.; almost brassy green on head and thorax dorsally, but otherwise more bluish; face considerably longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus rather strongly convex, somewhat produced apically, median area of margin narrowly shining and impunctate; mandibles bidentate; cheeks very slightly broader than eyes; wings very lightly infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus without a median tubercle; mid and hind spurs piceous; pubescence entirely pale on head and thorax, yellowish-white above and on front of face, somewhat more whitish on cheeks, pleura and legs; quite copious and elongate on face, cheeks and dorsum of thorax; pubescence of abdominal terga very thin and obscure, suberect, entirely pale; punctures deep and distinct, rather close and coarse in general, rather coarse and distinct on vertex and upper part of face, becoming contiguous below ocelli, very fine and densely crowded below antennae and on clypeus, becoming somewhat more shallow and indefinite but very close on cheeks, punctures close and distinct over most of scutum, becoming slightly separated only in center of disc, those on scutellum more definitely but not widely separated, somewhat more coarse than on scutum; pleura rather dull, punctures rather shallow, but subcontiguous; lateral faces of propodeum dull, very finely roughened, posterior face becoming more densely tessellate, dorsal area very finely roughened or substriate in large part; abdominal terga shining, punctures quite deep and distinct, rather close and uniform in general, becoming somewhat more shallow and indistinct on the more apical terga, those on 6 becoming rather obscure apically; margins of all terga narrowly impressed, shining and impunctate; tergum 6 with a median, rounded, apical emargination, 7 broad and rather short, with a quite deep, median, emargination, more or less angulate on each side; sternum 2 rather broadly outcurved, covering in large part the following sterna, 3 with a rather deep, triangular, median emargination which is fringed with rather short, non-converging hairs (fig. 33), median third of 4 somewhat produced apically, quite densely, elongate setose on each side of a median, nonsetose, depressed line (fig. 34); sterna 5-8 entirely retracted, median area of 6 rather broadly produced medially; genital armature as shown (fig. 35).

DISTRIBUTION — Minnesota to Maine, south to Illinois and North Carolina, April to August.

FLOWER RECORDS — *Cercis, Claytonia, Geranium, Lupinus, Pedicularis, Rubus, Trifolium, Vicia* and *Viola.* Additional records by Robertson (1929) include *Astragalus, Cardamine, Collinsia, Dicentra, Erythronium, Nepeta* and *Pentstemon.*

Osmia (Chenosmia) illinoensis Robertson

(Fig. 33)

Osmia illinoensis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 347. ♂.

Osmia illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Osmia (Nothosmia) illinoensis Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 83.

Osmia (Chenosmia) illinoensis Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE—Length 11 mm.; brilliant green; face considerably longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus broadly convex, considerably produced apically, median area of margin very slightly incurved, narrowly blackened and shining, with a series of shallow pits; median length of labrum about equal to basal width; dentate margin of mandibles much as in *distincta* (fig. 32); cheeks much broader than eyes; wings subhyaline basally, becoming lightly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal

cell considerably nearer apex than 1st does to base; coxae, trochanters, femora, tibiae and hind basitarsi strongly metallic-green, other tarsal segments chiefly black, mid and hind spurs piceous; pubescence largely pale on cheeks below, on pleura and propodeum, the face, vertex, scutum and scutellum with short, suberect, whitish pubescence interspersed with elongate and erect fuscous hairs; basal abdominal tergum covered with elongate and rather dense whitish pubescence, that on the following terga pale, short and thin, but erect and quite evident, that on 6 subappressed, very fine and inconspicuous, scopa entirely black; punctures fine, close, deep and rather distinct in general, subcontiguous or crowded over most of head and thorax, but pleura rather dull, with dense, somewhat shallow, confluent punctures; lateral faces of propodeum somewhat smoother but dull, posterior face rather dull, punctures dense but very shallow and obscure, dorsal area rather smooth and velvety, becoming very narrowly and finely substriate along upper margin; abdomen shining, punctures fine, quite close but not crowded on terga 1-5, uniformly fine and crowded on 6, apical margins very slightly and narrowly impressed, these areas deeply punctate nearly to the rims.

MALE — Length 8-9 mm.; brilliant green; face considerably longer than distance between eyes above; eyes convergent below; lateral ocelli subequally distant from eyes and each other, slightly nearer margin of vertex; clypeus convex, somewhat produced apically, margin nearly straight, the edge narrowly blackened, shining and impunctate, with a few, minute crenulations; median length of labrum slightly less than basal width; mandibles distinctly bidentate; cheeks about equal to eyes in width; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsi with a small tubercle near apical third, the more apical tarsal segments dark, but basitarsi and remainder of legs brilliant green, mid and hind spurs piceous; pubescence entirely yellowish-white, rather long, erect and copious on head, thorax and basal abdominal tergum, short and erect, but rather copious on terga 2-6; punctures close and rather coarse over most of head and thorax, deeper and more distinct on vertex and dorsum of thorax, crowded on pleura, lateral faces of propodeum somewhat smoother but tessellate, posterior face with shallow, scattered and vague punctures, dorsal area somewhat velvety, becoming narrowly, irregularly striate along upper margin; abdominal terga shining, quite deeply and closely punctate in general, apical margins rather narrowly depressed, partially invaded by very fine punctures, but apical rims narrowly shining and impunctate; tergum 6 with a very small and obscure, median, apical emargination, 7 not metallic, quite broad and triangularly produced, with a subtriangular and rather shallow, median emargination; sternum 2 broadly outcurved apically, covering sternum 3 in large part and base of 4, 3 with a deep, triangular, median emargination which is partially filled with more or less convergent setae (fig. 33), 4 broadly produced apically, very slightly incurved and sparsely, finely setose medially, 5-8 entirely retracted and submembraneous.

A study of the genital armature of *illinoensis* was not possible because of insufficient material.

DISTRIBUTION — Illinois to Texas, no seasonal data available but from the flower records it appears to be vernal, as most species in this genus.

FLOWER RECORDS — Robertson (1929) has recorded this species on *Astragalus, Fragaria, Hypoxis, Lithospermum* and *Ranunculus*.

Osmia (Chenosmia) inermis (Zetterstedt)

(Figs. 32-34)

Anthophora (Osmia) inermis Zetterstedt, 1838. Ins. Lapponica 1, p. 466. ♀.
Osmia parietina Smith, 1844. Zoologist 2, p. 743. ♀.
Osmia globosa Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 36. ♀.
Osmia vulpecula Gerstaeker, 1869. Stettin. Ent. Ztg. 30, p. 335. ♀.
Osmia globosiformis Cockerell, 1910. Canad. Ent. 42, p. 311. ♂.
Osmia (Melanosmia) inermis Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 34.
Osmia (Chenosmia) inermis Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 10 mm.; entirely black, without metallic tints; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, somewhat nearer to each other; clypeus broadly convex, apical margin considerably produced, median area quite straight, with a shining, impunctate rim; median length of labrum about equal to basal width; mandibles 3-dentate, as shown (fig. 32); cheeks considerably broader than eyes; wings subhyaline, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base;

tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head, thorax and basal abdominal tergum yellowish-white, and whitish on basal segments of legs, but becoming black on tibiae and tarsi; scopa black, pubescence on abdominal terga 3-5 black and erect, black apically and pale basally on 2, pale and obscure on 6; punctures rather fine but deep and distinct, close over most of head and thorax, densely crowded on face, slightly separated only in center of scutum; pleura dull, with densely crowded punctures, lateral and posterior faces of propodeum smooth, but dull, without distinct punctures, dorsal area velvety, not becoming definitely striate along dorsal margin; punctures of abdominal terga very fine and slightly separated medially on 1-5, becoming very close at extreme sides, apical margins only slightly depressed, punctures more minute and sparse, the rims slightly reddened and impunctate, punctures of 6 minute and densely crowded.

MALE—Length 9 mm.; entirely black, without metallic tints; face not much longer than distance between eyes above; eyes somewhat convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; clypeus only slightly convex, apical margin considerably produced, quite straight and narrowly impunctate medially; mandibles bidentate; cheeks considerably broader than eyes; wings subhyaline, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments slender and unmodified, anterior margin of hind basitarsus with a triangular, submedian tubercle; mid and hind spurs blackish; pubescence entirely yellowish-white, rather copious and erect over entire head and thorax, pale on basal abdominal tergum and in large part on tergum 2, discs of following terga with erect, more or less fuscous but rather thin pubescence; punctures rather deep and distinct but fine and close in general, crowded beneath pubescence on lower part of face, more coarse and distinct above and on cheeks, slightly separated in center of scutum and distinct but quite close on scutellum; pleura dull, with rather shallow, subcontiguous punctures; lateral faces of propodeum rather smooth but dull, punctures close but vague and indistinct, posterior face dull and tessellate punctures hardly evident, dorsal area velvety, not definitely striate along upper margin; punctures of abdominal terga minute, but quite close on 1 and 2, slightly separated medially on 3 and 4, more minute and vague on 5, and becoming rather sparse and indefinite on 6, apical margins rather broadly impressed and impunctate, more or less brownish-hyaline, that of tergum 6 with a shallow, median emargination, 7 quite broad but with a deep, rounded, median emargination; sternum 2 broadly rounded apically, covering much of the following sterna, 3 with a very deep, triangular, median emargination which is to a considerable degree filled with fine, converging setae (fig. 33), median area of 4 subtruncate (fig. 34), 6 with a somewhat rounded, median, apical lobe which has a very slight median emargination; genital armature resembling that of *O. virga* (fig. 35), with broad, subtruncate penis valves, but tips of gonocoxites not so narrow and elongate (much as in *sandhouseae*, fig. 31).

DISTRIBUTION — This is holarctic and has been found in eastern North America in Labrador, Quebec, the New England states and Wisconsin, from May to July.

FLOWER RECORDS — *Rubus, Salix* and *Vaccinium.*

Osmia (Chenosmia) proxima Cresson

Osmia proxima Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 32. ♂.
Osmia sericea Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 27. ♂.
Osmia melanotricha Lovell and Cockerell, 1907. Psyche 14, p. 16. ♀.
Osmia (Nothosmia) proxima Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 129.
Osmia (Chenosmia) proxima Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 8 mm.; dark blue; face considerably longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from each other and margin of vertex, slightly more distant from eyes; clypeus convex, considerably produced apically, margin straight, narrowly polished and impunctate medially, but with a few irregular striations; median length of labrum about equal to basal width; mandibles not much broadened apically, dentition about as in *atriventris* (fig. 32); cheeks slightly broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence largely whitish on head and thorax, clypeus with erect, more or less fuscous hairs, and a few erect fuscous hairs on face above antennae; pubescence of thorax entirely white, rather short and thin, somewhat copious behind wing bases; basal abdominal tergum entirely pale pubescent, scopa black, discal pubescence of the terga very short and incon-

spicuous, erect and dark on 3-5, 6 with dense, subappressed, silvery pubescence; punctures quite deep and distinct, rather close in general, close but not crowded on vertex and cheeks, becoming rather densely crowded below ocelli and especially on clypeus, crowded on scutum anteriorly and laterally, but becoming well separated medially toward scutellum, the latter with somewhat finer punctures and a narrow median impunctate line; pleura dull, punctures rather shallow but subcontiguous; lateral and posterior faces of propodeum rather smooth but dull, dorsal area velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga polished, punctures minute, well separated, becoming quite close at extreme sides, apical margins narrowly depressed, somewhat invaded by sparse, minute punctures, only the very narrow rims impunctate, tergum 6 minutely and densely punctate.

MALE — Length 8 mm.; bluish-green, but dorsum of head and thorax somewhat more brassy green; face considerably longer than distance between eyes above, eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, considerably nearer margin of vertex; clypeus only slightly convex, considerably produced apically, margin nearly straight, narrowly polished and impunctate medially; labrum considerably shorter than its basal width; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline basally, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a very small tubercle near apical third, mid and hind spurs piceous; pubescence entirely whitish, rather dense on lower part of face, on cheeks, and on posterior areas of thorax; punctures deep and distinct, quite close in general, close but not crowded on vertex, becoming more densely crowded below ocelli and on clypeus, very fine and close on cheeks below; punctures quite fine and close on scutum laterally and anteriorly, becoming slightly separated medially toward scutellum, this with distinctly but not widely separated punctures and with a median, impunctate line; punctures of pleura nearly contiguous; lateral faces of propodeum quite smooth but dull, dorsal area of posterior face velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga shining, punctures minute, distinctly but not widely separated, becoming somewhat closer at extreme sides, apical margins largely impunctate; tergum 6 rather shallowly and sparsely punctate toward sides apically, the margin with a rather shallow but distinct, median, semicircular emargination, 7 rather broadly produced medially, with a deep, semicircular emargination; sternum 2 rather broadly outcurved apically, largely covering 3 and base of 4, 3 with a deep, median, triangular, apical emargination which is entirely filled with converging setae, 4 rounded apically, this area rather finely and closely setose, 5-8 entirely retracted, submembraneous; genital armature resembling that in *albiventris* (fig. 35).

DISTRIBUTION — Alaska to Nova Scotia, south to Idaho, Wyoming, Illinois and Georgia, May to September.

FLOWER RECORDS — *Houstonia, Pentstemon, Rubus* and *Trifolium.*

Although the name *sericea* has page precedence over *proxima,* the latter name has been commonly in use, and was selected by Sandhouse (1939).

Osmia (Chenosmia) tersula Cockerell

(Figs. 34 & 35)

Osmia tersula Cockerell, 1912. Canad. Ent. 44, p. 358. ♂

Osmia subarctica Cockerell, 1912. Canad. Ent. 44, p. 357. ♀.

Osmia (Nothosmia) tersula Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 116.

Osmia (Chenosmia) tersula Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 235.

FEMALE — Length 9-10 mm.; dark blue, with greenish tints, legs blackish; face somewhat longer than distance between eyes above; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, each other and margin of vertex; clypeus convex, considerably produced apically, median third of margin straight, narrowly shining and obscurely striate; median length of labrum about equal to basal width; mandibles not much broadened apically, with an apical and an inner tooth and an upper bevelled edge (resembling *inermis,* fig. 32); cheeks much broader than eyes; wings subhyaline basally, becoming faintly infuscated apically, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; tarsal segments simple and unmodified, mid and hind spurs piceous; pubescence of head and thorax largely pale, rather long and copious, but cheeks below with a few dark hairs behind eyes; scopa largely black, but sometimes with intermixed pale hairs; basal abdominal tergum long white pubescent, discs of the following terga with thin and short, inconspicuous, erect hairs, entirely pale on 2 and 3, becoming somewhat more elongate and darker, especially

at sides, on 4 and 5, 6 rather densely covered with short, subappressed, pale pubescence; punctures in general quite deep and distinct, close but not crowded on vertex and cheeks, becoming densely crowded below ocelli and over clypeus, crowded and rather fine on scutum laterally and anteriorly, becoming rather well separated in center of disc, scutellum distinctly and quite closely punctate in large part, but punctures becoming crowded around posterior and lateral margins; pleura shining, punctures rather shallow but close; lateral faces of propodeum rather smooth but dull or finely tessellate, posterior face becoming very obscurely punctate, dorsal area tessellate and dull but rather smooth, becoming very finely and obscurely striate along upper margin; abdominal terga shining, punctures fine and quite close across base of each disc, becoming rather widely separated toward the broad, depressed, apical margins which are entirely impunctate, punctures somewhat closer at extreme sides, tergum 6 finely and densely punctate.

MALE — Length 8 mm.; bluish-green, becoming somewhat more olive-green on upper portions of head and thorax; face only slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, somewhat nearer margin of vertex; clypeus slightly convex, considerably produced apically, the broad apical margin nearly straight, narrowly shining and impunctate; median length of labrum about equal to basal width; mandibles bidentate; cheeks subequal to eyes in width; wings subhyaline basally, becoming faintly infuscated apically and in region of marginal cell, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a robust, triangular, median tubercle, mid and hind spurs piceous; pubescence of head, thorax and basal abdominal tergum copious and elongate, entirely yellowish-white, largely obscuring surface around antennae and on clypeus, that on terga 2-6 entirely pale, rather short but erect and quite copious, more elongate on 4-6 laterally; punctures in general deep and distinct, close but not crowded on vertex and cheeks, becoming densely crowded below ocelli, fine and dense on clypeus beneath dense pubescence; punctures very close on scutum laterally and anteriorly, becoming slightly separated in center of disc, close but distinct on scutellum, becoming crowded around posterior margin; pleura somewhat shining, but punctures close in large part, lateral faces of propodeum smooth but rather dull, posterior face more tessellate, punctures hardly evident, dorsal area dull and velvety, becoming very narrowly and obscurely substriate along upper margin; abdominal terga shining, punctures quite deep and distinct, uniformly close to margins of apical depressed areas which are quite broad and entirely impunctate; apical margin of tergum 6 with a shallow but distinct, median emargination, 7 rather broadly produced medially, with a semicircular, median emargination; sternum 2 broadly outcurved apically, covering sternum 3 and base of 4 in large part, apical margin of 3 broadly emarginate medially, fringed with setae which converge but do not meet medially; sternum 4 produced apically, median third straight, slightly thickened and densely setose (fig. 34), 5-8 entirely retracted, apical margin of 6 broadly produced medially; genital armature as shown (fig. 35).

DISTRIBUTION — Alaska to Hudson's Bay and New Brunswick, south to Colorado, Wisconsin and Michigan, in June.

FLOWER RECORD — *Rubus*.

Osmia (Chenosmia?) virga Sandhouse

(Figs. 33 & 35)

Osmia (Nothosmia) virga Sandhouse, 1939. Ent. Soc. Wash. Mem. 1, p. 130. ♂.

Osmia (Chenosmia?) virga Sinha, 1958. Univ. Kans. Sci. Bul. 39, p. 253.

MALE — Length 7.5-8 mm.; bluish-green, but face, vertex and dorsum of thorax somewhat more olive-green, legs black; face slightly longer than distance between eyes above; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, much nearer margin of vertex; clypeus convex, somewhat produced apically, the broad apical margin nearly straight, very narrowly shining and impunctate; median length of labrum slightly less than basal width; mandibles bidentate; cheeks very slightly broader than eyes; wings subhyaline, becoming very faintly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell considerably nearer apex than 1st does to base; tarsal segments slender and simple, anterior margin of hind basitarsus with a very low and inconspicuous tubercle near apical third, mid and hind spurs piceous; pubescence entirely pale, largely yellowish-white on face and dorsum of thorax, otherwise more whitish, copious and elongate on face and clypeus, cheeks below, on basal abdominal tergum and over most of thorax; discs of abdominal terga 2-5 with short, erect but quite copious, yellowish pubescence which does not hide the surface; punctures in general deep and

distinct, rather coarse and close but not crowded on vertex, becoming somewhat closer but more shallow on cheeks, quite densely crowded below ocelli, very fine and densely crowded on clypeus beneath pubescence; punctures quite uniformly coarse and close on scutum, being very slightly separated only in center of disc, those of scutellum close but not crowded, becoming fine and obscure around posterior margin; pleura dull, punctures rather shallow but largely contiguous, with a restricted area beneath tegulae which is more shining and sparsely punctate; lateral faces of propodeum somewhat shining and shallowly, obscurely punctate along anterior margin, becoming smoother but dull posteriorly, posterior face more tessellate, with shallow, obscure, scattered punctures, dorsal area smooth but velvety, becoming rather broadly substriate along upper margin; abdominal terga shining, punctures quite deep and distinct but rather fine, rather uniformly close but not crowded, quite evenly distributed to the rather broad, depressed and entirely impunctate, apical margins; punctures of tergum 6 much finer and more sparse in general, apical margin with a shallow median, emargination, 7 rather broadly produced apically, with a semicircular, median emargination; sternum 2 broadly outcurved apically, largely covering 3 and base of 4, apical margin of 3 with a rather large, triangular, median emargination which is largely filled with elongate, convergent setae (fig. 33), 4 rather broadly produced apically, median area quite straight, surface rather uniformly, finely setose across entire plate; sterna 5-8 entirely retracted, submembraneous; genital armature as shown (fig. 35).

DISTRIBUTION — Wisconsin to Massachusetts and Virginia, April and May.

FLOWER RECORD — *Salix*.

Table 4—Distribution of species of *Osmia* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Osmia (Osmia)	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
lignaria	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X				X	
(Acanthosmioides)																											
integra								X																			
(Cephalosmia)																											
subaustralis								X																			
(Centrosmia)																											
bucephala	X			X		X		X			X		X		X				X		X	X				X	
nigriventris																											
(Monilosmia)																											
felti		X		X									X		X			X				X					
simillima	X	X	X	X		X	X	X	X	X	X		X		X				X			X					
(Diceratosmia)																											
conjuncta							X	X	X		X		X			X			X		X	X					
subfasciata																					X	X		X			X
s. miamiensis																											X
(Chalcosmia)																											
chalybea						X								X								X				X	X
coerulescens	X	X		X		X	X	X	X	X	X		X	X	X	X			X	X		X					
georgica				X				X				X	X		X	X			X	X	X	X				X	X
texana								X					X														X
(Nothosmia)																											
albiventris	X		X	X		X	X	X	X	X	X		X	X	X			X	X		X	X				X	
cordata									X	X	X																
distincta	X	X	X	X		X	X	X	X		X		X		X				X		X	X					
inspergens	X	X		X	X	X	X	X	X	X	X		X	X	X	X		X	X	X		X				X	
michiganensis								X																			
pumila	X	X		X	X	X	X	X	X	X	X		X	X	X	X		X	X	X		X				X	
sandhouseae				X									X	X								X		X		X	X
(Chenosmia)																											
atriventris	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X					X	X				X	X
collinsiae	X	X	X		X			X	X				X		X	X			X			X					
illinoensis									X																		
inermis	X			X		X	X																				
proxima	X	X	X	X	X	X	X	X	X				X	X								X				X	
tersula							X	X																			
virga				X		X	X							X	X				X								

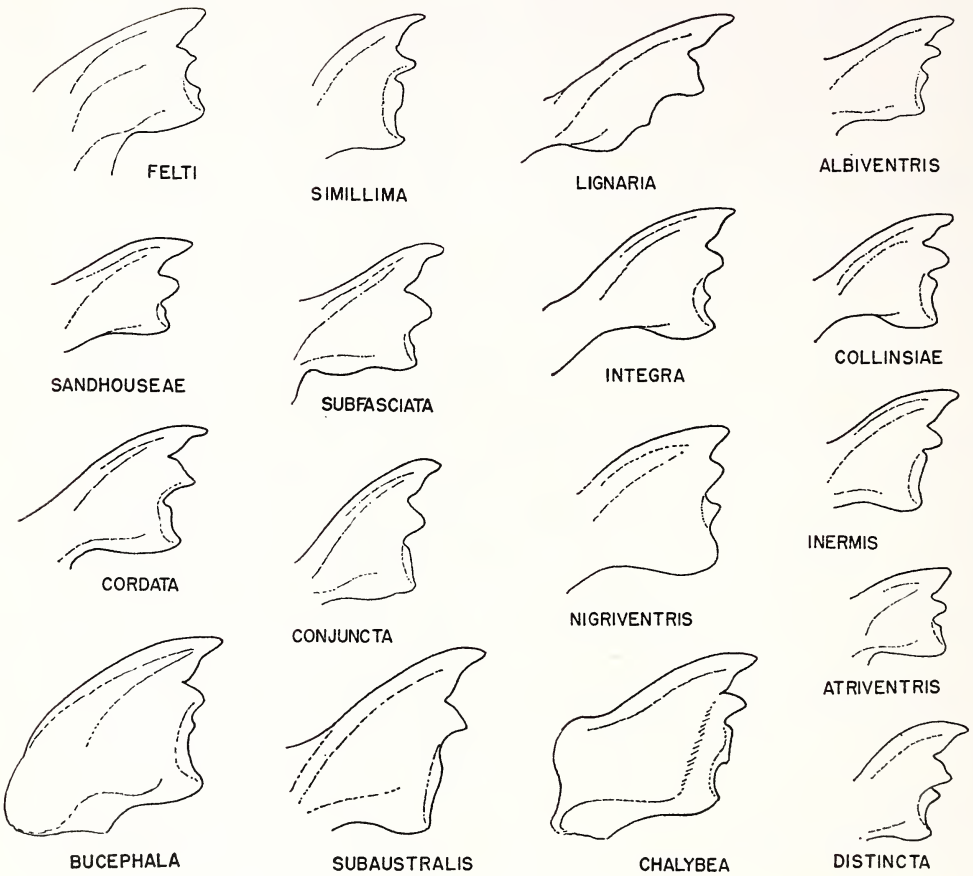


Figure 32—Mandibles in females of *Osmia*.

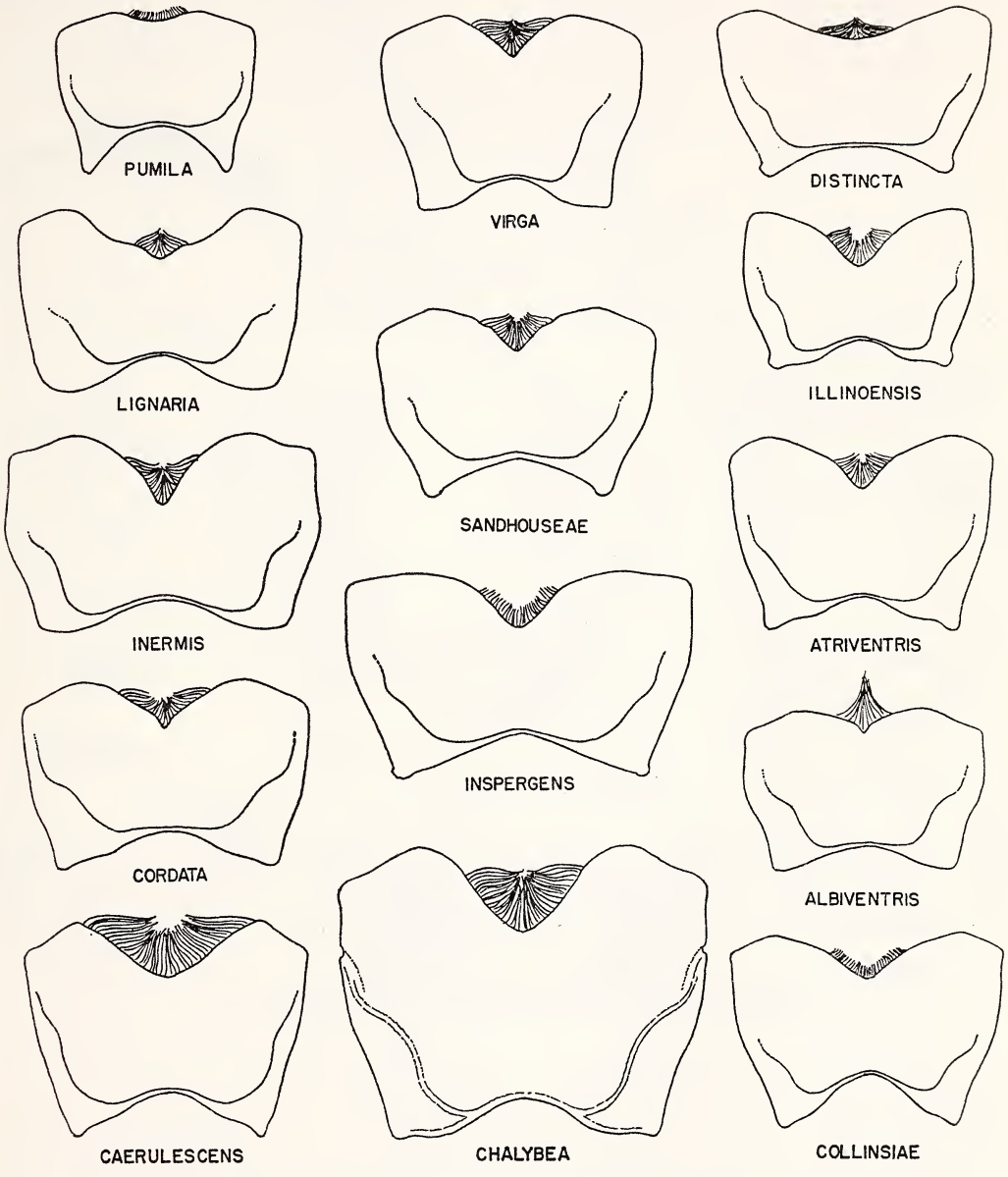


Figure 33—Abdominal sternum 3 in males of *Osmia*.

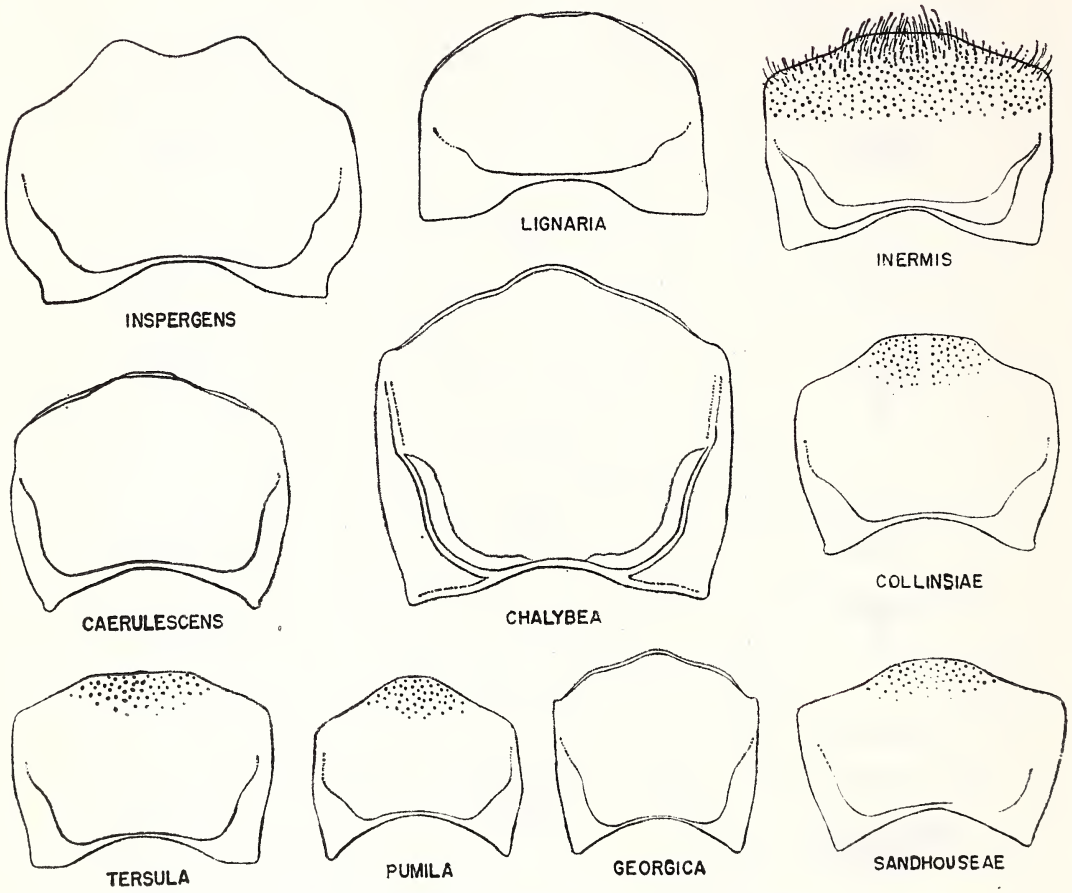


Figure 34—Abdominal sternum 4 in males of *Osmia*.

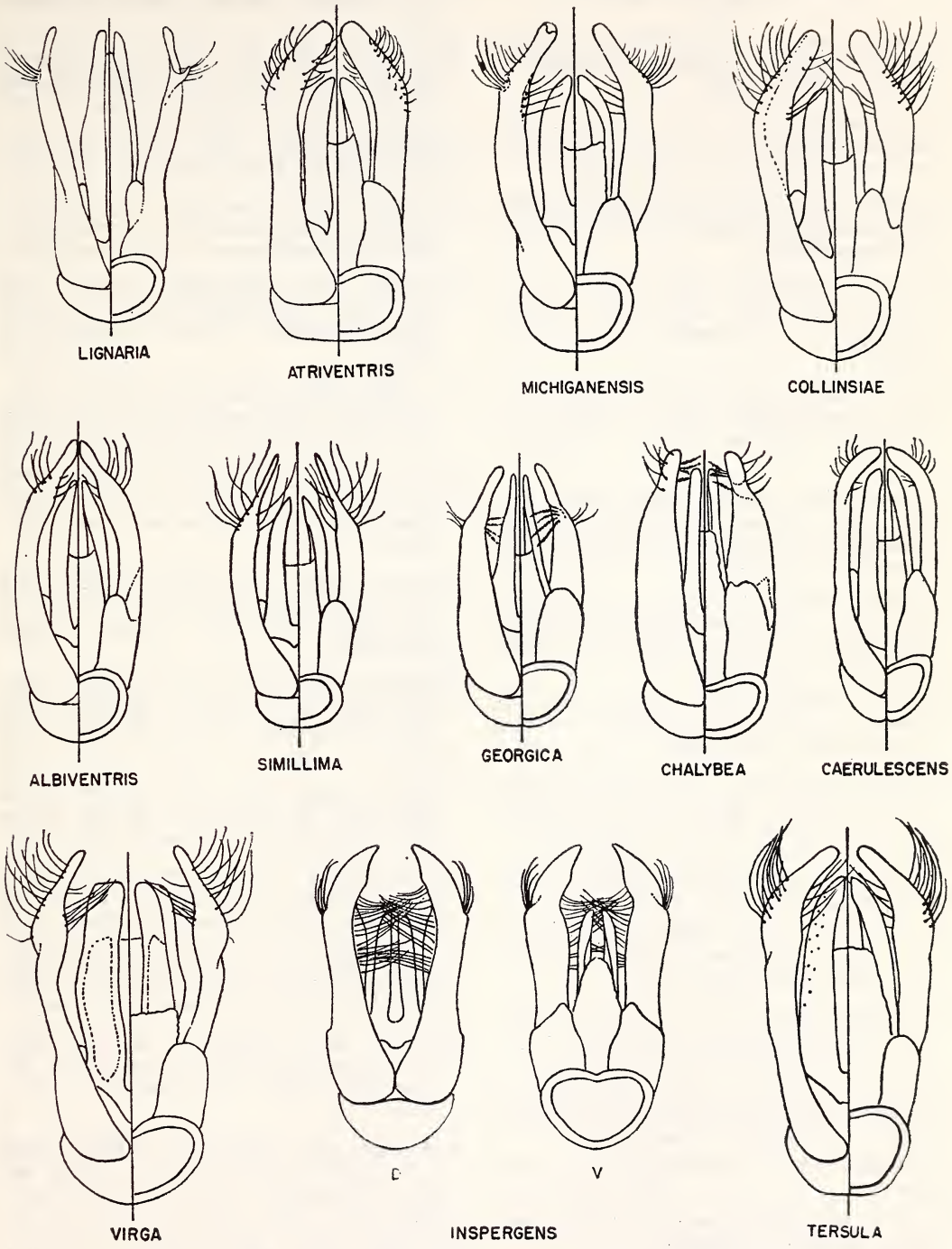


Figure 35—Dorsal and ventral views of genital armature in males of *Osmia*.

Megachile Latreille
(Fig. 1)

Megachile Latreille, 1802. Hist. Nat. Formis. p. 434. Type: *Apis centuncularis* Linnaeus. Desig. by Curtis, 1828.

Anthophora Fabricius (not Latreille), 1804. Systema Piezatorum, p. 372. Type: *Apis centuncularis* Linnaeus. Pres. desig.

Megachile subg. *Eutricharaea* Thomson, 1872. Hym. Scand., 2, p. 228. Type: *Apis argentata* Fabricius. Monob.

Gnathocera Provancher, 1883. Nat. Canad. 13, p. 232. Preocc. Type: (*Gnathocera cephalica* Provancher) = *Megachile pugnatus* Say. Monob.

Megachile subg. *Paramegachile* Friese, 1899. Die Bienen Europas, v. 5, p. 34. Type: *Apis argentata* Fabricius. Desig. by Mitchell, 1934.

Chelostomoides Robertson, 1901. Canad. Ent. 33, p. 231. Type: (*Megachile rufimanus* Robertson) = *Chelostoma rugifrons* Smith. Monob. and orig. desig.

Anthemois Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Type: (*Megachile infragilis* Cresson) = *Apis centuncularis* Linnaeus. Monob. and orig. desig.

Ceratias Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Preocc. Type: *Megachile pugnatus* Say. Orig. desig.

Gnathodon Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Preocc. Type: *Megachile georgica* Cresson. Monob. and orig. desig.

Oligotropus Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Type: *Oligotropus campanulae* Robertson. Monob. and orig desig.

Xanthosarus Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 168. Type: *Megachile latimanus* Say. Monob. and orig. desig.

Cyphopyga Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 169. Type: *Megachile montivaga* Cresson. Monob. and orig. desig.

Sayapis Titus, 1905. Ent. Soc. Wash. Proc. 7, p. 154. Proposed to replace *Gnathocera* Provancher and *Ceratias* Robertson.

Megalochila Schulz, 1906. Spolia Hym., p. 64. Emend.

Megachile subg. *Paramegalochila* Schulz, 1906. Spolia Hym., p. 71. Emend.

Megachile subg. *Delomegachile* Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22, p. 745. Type: (*Megachile vidua* Smith) = *Megachile frigida* Smith. Monob.

Sarogaster Robertson, 1918. Ent. News 29, p. 92. Proposed to replace *Gnathodon* Robertson.

Megachiloides Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 154. Type: *Megachiloides oenotherae* Mitchell. Monob.

Megachile Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 295-361. Revision.

Megachile subg. *Litomegachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 301 & 308. Type: *Megachile brevis* Cresson. Orig. desig.

Megachile subg. *Leptorachis* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 301 & 308. Type: *Megachile petulans* Cresson. Orig. desig.

Megachile subg. *Argyropile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 308. Type: *Megachile parallela* Smith. Orig. desig.

Megachile subg. *Neomegachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 307. Type: *Megachile chichimeca* Cresson. Orig. desig.

Megachile subg. *Cressoniella* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 307. Type: *Megachile zapoteca* Cresson. Orig. desig.

Megachile subg. *Xeromegachile* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 302 & 309. Type: *Megachile integra* Cresson. Orig. desig.

Megachile subg. *Phaenosarus* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 309. Type: *Megachile fortis* Cresson. Orig. desig.

Megachile subg. *Pseudocentron* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 307. Type: *Megachile pruina* Smith. Orig. desig.

Megachile subg. *Acentron* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 307. Type: *Megachile albitarsis* Cresson. Orig. desig.

Megachile subg. *Melanosarus* Mitchell, 1934. Amer. Ent. Soc. Trans. 59, pp. 303 & 307. Type: *Megachile xylocopoides* Smith. Orig. desig.

Megachile subg. *Derotropis* Mitchell, 1936. Amer. Ent. Soc. Trans. 62, pp. 119 & 156. Type: *Megachile pascoensis* Mitchell. Orig. desig.

Megachile subg. *Argyropile* Mitchell, 1943. Pan-Pacific Ent. 19, p. 16. (key)

Megachile subg. *Chelostomoides* Mitchell, 1956. Pan-Pacific Ent. 32, p. 134. (key)

Megachile is a cosmopolitan group of non-metallic, usually robust, black bees. The basal abdominal tergum is concave anteriorly, but not carinate. The posterior face of the propodeum and the metanotum are nearly perpendicular, with no dorsal pitted area. The scutellum is broad, its hind margin nearly straight, with rather large axillae which are not conspicuously protuberant and never acute. The pleura and tubercles lack carinae and the notaulices are linear. In the front wings both recurrent veins are received by the 2nd submarginal cell. The maxillary palpi are 3 segmented, while the mandibles are 3- to 5-dentate.

In the males the front coxae usually are spinose, and the front tarsi are often much dilated and modified. Tergum 6 is more or less vertical, usually with a subapical carina which forms the actual apex of the abdomen. Tergum 7 and the true apical margin of 6 are ventral in position. Sterna 1-4 commonly are exposed, 5-8 retracted and highly modified.

Typically these are leaf-cutters, the females cutting circular or oval pieces of leaves which are used as cell linings and caps. These cells are constructed in a variety of locations, many species nesting in the soil, sometimes gregariously, while others make their tunnels in rotting wood, or use borings or cavities in wood or in plant stems. One group of species, the subgenus *Chelostomoides*, does not cut leaves, but uses resin in the construction of the cells. This group appears to be related to other groups in other parts of the world, which have somewhat similar habits, and it is probable that these will eventually be separated from *Megachile* as a distinct genus.

Summary of key to females of *Megachile*

A—Mandibles without distinct, bevelled, cutting edges—couplet 2 (below)

B—Mandibles 5-dentate—couplet 8 (p. 110)

C—Mandibles 3-dentate—*oenotherae* (p. 110)

D—Abdominal sterna with white apical fasciae beneath the scopa—couplet 19 (p. 110)

E—Mandible lacking a cutting edge between the two inner teeth—couplet 22 (p. 111)

F—Sternum 6 either bare, or with a bare apical rim—couplet 28 (p. 111)

G—Inner-most tooth or angle of mandible either rounded or broadly truncate, never acute—couplet 33 (p. 111)

H—Tergum 6 concave in profile—couplet 41 (p. 112)

I—Mandible slightly angulate between the two inner teeth—*mendica* (p. 112)

J—Mandible without an angle between the two inner eeth—couplet 44 (p. 112)

Summary of key to males of *Megachile*

A—Abdominal sternum 4 retracted, entirely covered by sternum 3—couplet 2 (p. 112)

B—Carina of tergum 6 entire, more or less rounded—couplet 7 (p. 112)

C—Front coxal spines much reduced or lacking—couplet 15 (p. 113)

D—Mid tibial spurs absent—couplet 20 (p. 113)

E—Front basitarsi dilated, usually excavated anteriorly, and usually pale in color—couplet 26 (p. 113)

F—Mandibles 4-dentate—couplet 36 (p. 114)

G—Apical margin (not carina) of tergum 6 lacking evident teeth—couplet 39 (p. 114)

H—Tergum 7 terminating in a conspicuous, median, apical spine — *frugalis* (p. 114)

I—Tergum 7 not spinose—couplet 42 (p. 114)

KEY TO SPECIES

Females

1. Mandibles with bevelled, cutting edges that occupy the intervals between distinct, angulate teeth 7
   Mandibles lacking distinct, bevelled, cutting edges 2

2. Thorax and abdominal terga 2 and 3 densely covered with fulvous pubescence .. *(Archimegachile) lanata* Fabricius (p. 181)
   Pubescence of thorax and abdomen white or greyish, with possible black intermixture *(Chelostomoides)* 3

3. Clypeus deeply excavated medially to the practical obliteration of the outer surface except at extreme sides; mandibles very long and slender ..... *rugifrons* (Smith) (p. 187)
Clypeus flattened, unmodified; mandibles relatively short and broad 4

4. Clypeal margin entire ..... *georgica* Cresson (p. 186)
Clypeal margin denticulate or emarginate 5

5. Abdominal tergum 5 with a conspicuous, entire, white, apical fascia; clypeal margin with a rather broad, shallow, median emargination in the center of which is a small denticle ..... *exilis parexilis* Mitchell (p. 184)
Fascia of tergum 5 reduced and inconspicuous; clypeal margin with a narrow, median emargination which is almost as deep as it is wide, lacking the median denticle 6

6. Pubescence of abdominal tergum 6 entirely pale; wings subhyaline; size rather small (10-11 mm.). ..... *campanulae campanulae* Robertson (p. 182)
Tergum 6 with erect black hairs in addition to the white tomentum; wings infuscated; larger (11-12 mm.). ..... *campanulae wilmingtoni* Mitchell (p. 184)

7(1). Mandibles more or less distinctly 5-dentate (including the inner angle of the dentate margin) 8
Mandibles with at most but four distinct teeth 17

8. Mid basitarsi equal in length to their tibiae; the two apical mandibular teeth separated from the three inner teeth by a long cutting edge *(Melanosarus)* .. 9
Mid tibiae usually somewhat longer than their basitarsi; if teeth grouped as above, then cutting edge very short ..10

9. Wings very deeply infuscated, purplish; abdomen with numerous rather large and deep punctures ..... *xylocopoides* Smith (p. 171)
Wings less deeply infuscated, not purplish, hind wings nearly subhyaline; punctures of abdomen very minute and sparse .. *bahamensis* Mitchell (p. 169)

10(8). Emargination between 3rd and 4th mandibular teeth deeper than it is long, fully occupied by the bevelled cutting edge, 4th tooth very narrow 11
Emargination between 3rd and 4th teeth not so deep, usually lacking the cutting edge, 4th forming an obtuse angle *(Megachile)* 13

11. Apex of sternum 6 thickened, produced slightly beyond apex of tergum; lateral ocelli nearer eyes than to margin of vertex ..... *fortis* Cresson (p. 156)
Apex of sternum 6 neither thickened nor protuberant; lateral ocelli slightly nearer margin of vertex than to eyes *(Xanthosarus)* 12

12. Black pubescence of scutum more extensive covering more than half of disc, and often extending onto scutellum ..... *perihirta* Cockerell (p. 159)
Black pubescence of scutum covering little more than half of disc, usually not invading scutellum ..... *latimanus* Say (p. 157)

13(10). Scopa black on apical abdominal sterna ..... *nivalis* Friese (p. 129)
Scopa entirely pale 14

14. Abdominal tergum 6 in profile showing abundant, long and erect pubescence 15
Tergum 6 in profile showing only short, appressed or suberect pubescence ...16

15. Pubescence of tergum 6 entirely dark .. *centuncularis* (Linnaeus) (p. 124)
Tergum 6 with appressed golden tomentum and erect dark hairs ..... *relativa* Cresson (p. 129)

16(14). Tergum 6 concave in profile, covered with appressed silvery tomentum .... *montivaga* Cresson (p. 127)
Tergum 6 straight in profile, its pubescence entirely blackish or fuscous .... *inermis* Provancher (p. 126)

17(7). Mandibles 3-dentate, a long bevelled cutting edge between 2nd tooth and inner angle; glossa and labial palpi exceedingly long, reaching beyond middle of the abdomen ..... *(Megachiloides) oenotherae* (Mitchell) (p. 141)
Mandibles 4-dentate; glossa and labial palpi of ordinary length 18

18. Abdominal sterna with distinct, entire, white, apical fasciae beneath the scopa *(Eutricharaea)* 19
Abdominal sterna not fasciate 21

19. Apical margin of clypeus angulate medially, slightly emarginate on each side ..... *apicalis* Spinola (p. 120)
Clypeal margin nearly straight, lacking a median angle 20

20. Abdomen with black hairs visible at sides of terga 2-6 in dorsal view, tergum 6

without pale tomentum .... (?) *rotundata* (Fabricius) (p. 122)
Black hairs visible at sides of terga 5 and 6 only, entirely pale on 2-4; tergum 6 usually with some subappressed pale tomentum ... *concinna* Smith (p. 121)

21(18). Bevelled cutting edge definitely absent between the two inner mandibular teeth 22
A bevelled cutting edge present between the two inner teeth 27

22. Abdominal tergum 6 in profile showing no erect pubescence, covered with silvery, appressed tomentum .... *(Megachile) montivaga* Cresson (p. 127)
Tergum 6 in profile showing abundant, erect, black pubescence (*Sayapis*) ..23

23. Cheek with a conspicuous process on the inferior, posterior angle .... *pugnata* Say (p. 179)
Inferior angle of cheek without such a process 24

24. Clypeus with long, erect, black pubescence ....*frugalis frugalis* Cresson (p. 173)
Pubescence of clypeus entirely pale ...25

25. Clypeal margin with a very broad and shallow, median, emarginate area, the median portion of which is slightly thickened and produced .... *policaris* Say (p. 176)
Clypeal margin with a shallow incurved area on each side of center which is occupied by a low obtuse angle 26

26. Legs bright ferruginous ....*inimica inimica* Cresson (p. 174)
Legs black. *inimica sayi* Cresson (p. 176)

27(21). Abdominal sternum 6 with central area largely bare, or with an apical bare rim or ridge extending beyond the apical fringe of short hairs 28
Sternum 6 uniformly covered with hairs, lacking the bare apical rim 32

28. Third mandibular tooth truncate, emargination between it and 2nd tooth very short, lacking any bevelled cutting edge 29
Third mandibular tooth acute, a rather deep emargination between it and 2nd tooth, occupied in part by a short cutting edge 30

29. Abdominal sternum 6 with a bare rim extending beyond the apical fringe; tergum 6 in profile showing not erect pubescence ..... *(Acentron) albitarsis* Cresson (p. 165)
Sternum 6 without a bare apical rim; tergum 6 in profile showing abundant, short, erect pubescence ..... *(Leptorachis) petulans* Cresson (p. 163)

30(28). Apical rim of sternum 6 reflexed abruptly, forming a right angle with the surface of the plate *(Argyropile)* 31
Apical rim of sternum 6 not reflexed; mid basitarsi with fuscous or blackish pubescence covering outer face ..... *(Pseudocentron) pruina* Smith (p. 167)

31. Abdominal tergum 6 concave in profile, entirely covered with closely appressed pale tomentum, without erect basal hairs . *townsendiana* Cockerell (p. 161)
Tergum 6 very nearly straight in profile, with erect hairs toward the sides basally ..... *parallela* Smith (p. 159)

32(27). Fourth or inner mandibular tooth rounded or broadly truncate *(Delomegachile)* 33
Fourth or inner-most tooth or angle of mandible acute 40

33. Inner mandibular tooth broadly truncate 34
Inner mandibular tooth rounded 37

34. At least some of the abdominal terga with entire, conspicuous, white, apical fasciae 35
Abdomen entirely lacking fasciae 36

35. Scopa black on sternum 6 and in part on 5 .....*ingenua* Cresson (p. 137)
Scopa entirely pale fulvous ....*frigida frigida* Smith (p. 133)

36(34). Scopa entirely black .... *gemula* Cresson (p. 134)
Scopa entirely fulvous .... *frigida appalachensis* Mitchell (p. 134)

37(33). Abdominal terga with conspicuous, entire, white, apical fasciae .... *addenda* Cresson (p. 131)
Abdomen not at all fasciate 38

38. Scopa entirely black 39
Scopa red or fulvous .... *melanophoea melanophoea* Smith (p. 138)

39. Pubescence of clypeus entirely black; tergum 2 with some black pubescence across apical margin, the disc largely pale pubescent .... *mucida* Cresson (p. 140)
Pubescence of clypeus pale in large part and that of tergum 2 entirely pale .... *melanophoea submelanophoea* Mitchell (p. 140)

40(32). Abdominal tergum 6 concave in profile *(Litomegachile)* 41
Tergum 6 straight in profile 43

41. Abdomen viewed from above showing abundant black pubescence at the sides of terga 2-6 .. *texana* Cresson (p. 118)
Abdomen viewed from above showing little or no black pubescence along the sides 42

42. Scopa entirely pale, and abdominal terga with but a slight amount of black pubescence ... *brevis brevis* Say (p. 114)
Scopa black on sternum 6, abdominal terga with much black pubescence on the discs .....
..*brevis pseudobrevis* Mitchell (p. 116)

43(40). Mandible with a slight angle between 3rd and 4th teeth, approaching a 5-dentate condition; scopa fulvous; abdominal tergum 6 lacking white tomentum .... *(Litomegachile) mendica* Cresson (p. 117)
Mandible not angulate as above; scopa white, sometimes black on apical sterna; tergum 6 with white or pale tomentum *(Xeromegachile)* 44

44. Lateral ocelli much nearer each other than to margin of vertex; large and robust (15 mm.) 45
Lateral ocelli subequally distant from each other and margin of vertex 46

45. Clypeal margin with a narrow, median, incurved area in the center of which is a minute denticle .....
.....*deflexa* Cresson (p. 146)
Clypeal margin straight and entire .....
..... *dakotensis* Mitchell (p. 145)

46(44). Abdominal tergum 6 convex in profile, somewhat flattened or compressed on each side apically .....
..... *rubi* Mitchell (p. 152)
Tergum 6 straight in profile, not compressed 47

47. Clypeal margin smooth, straight and entire; punctures on supraclypeal area crowded .. *integrella* Mitchell (p. 150)
Clypeal margin minutely crenulate; punctures of supraclypeal area separated by at least their own diameter 48

48. Scopa on sternum 5 entirely pale .....
..... *integra* Cresson (p. 148)
Scopa black across apical portion of sternum 5 .... *brimleyi* Mitchell (p. 143)

Males

1. Sternum 4 of abdomen retracted *(Chelostomoides)* 2
Sternum 4 exposed 6

2. Mandible without an inferior angle or tooth .... *rugifrons* (Smith) (p. 187)
Inferior margin of mandible angulate or toothed 3

3. Front tarsi dark, only slightly dilated and flattened 4
Front tarsi ferruginous, basal segments dilated and flattened 5

4. Smaller (9 mm.); wings subhyaline ....
.... *campanulae campanulae* Robertson (p. 182)
Larger (11 mm.); wings strongly infuscated .....
.... *campanulae wilmingtoni* Mitchell (p. 184)

5(3). Front coxae with well developed, though short, spines .....
.....*georgica* Cresson (p. 186)
Front coxal spines reduced to minute, inconspicuous tubercles .....
.... *exilis parexilis* Mitchell (p. 184)

6(1). Carina of tergum 6 entire, more or less rounded 7
Carina of tergum 6 usually with a distinct, median emargination, this sometimes obscured by lateral denticulations or crenulations 14

7. Glossa exceedingly long, nearly attaining tip of abdomen, and segment 2 of labial palpus about four times length of 1st ..
.. *(Megachiloides) oenotherae* Mitchell (p. 141)
Glossa of normal length, and segments 1 and 2 of labial palpus subequal *(Xeromegachile)* 8

8. Front tarsi simple, neither dilated nor excavated 9
Front basitarsi dilated and either yellowish or ferruginous in color, anterior margin more or less excavated 11

9. Lateral ocelli equidistant from margin of vertex and each other .....
..... *integrella* Mitchell (p. 150)
Lateral ocelli much nearer each other than to margin of vertex 10

10. Front tarsi yellow, contrasting with the dark mid and hind tarsi and with the other segments of the legs .....
.....*dakotensis* Mitchell (p. 145)
Front tarsi not contrasting with the remainder of the legs, usually piceous, but sometimes more or less ferruginous ..
..... *deflexa* Cresson (p. 146)

11(8). Hind basitarsi pale testaceous, very short, length only slightly greater than basal width . *integra* Cresson (p. 148)
Hind basitarsi dark, relatively narrow and elongate 12

12. Inferior mandibular projection robust, very broadly truncate ..... *(Phaenosarus) fortis* Cresson (p. 156)
Inferior mandibular projection slender and acute 13

13. Carina of tergum 6 triangular in outline, subacute; tergum 7 also triangularly pointed ..... *rubi* Mitchell (p. 152)
Carina of tergum 6 broadly rounded, subcrenulate; tergum 7 obtuse .... *brimleyi* Mitchell (p. 143)

14(6). Front coxal spines absent, or reduced to dentiform tubercles 15
Front coxal spines well developed 19

15. Lower margin of mandible straight, lacking any basal inferior tooth or protuberance ..... .*(Archimegachile) lanata* (Fabricious) (p. 181)
Mandible with a distinct and acute, basal, inferior tooth *(Megachile)* 16

16. Abdomen nearly impunctate; lateral ocelli much nearer each other than to margin of vertex; larger (13 mm.) .. .. *inermis* Provancher (p. 126)
Smaller; abdomen distinctly punctate .17

17. Clypeal margin with a distinct median tubercle; surface of tergum 6 above carina polished and sparsely punctate ..... *relativa* Cresson (p. 129)
Clypeal margin not tuberculate; surface of tergum 6 tuberculate or closely punctate 18

18. Coxal spines represented by dentiform tubercles; carina of tergum 6 with a distinct median emargination, surface above the carina dull, finely rugosopunctate ..*montivaga* Cresson (p. 127)
Coxal spines entirely lacking; carina of tergum 6 with median emargination obscured or lacking, surface above carina with numerous small tubercles, punctures obscure .... *centuncularis* (Linneaeus) (p. 124)

19(14). Mid tibial spurs absent 20
Mid tibial spurs present 25

20. Mandibles 3-dentate; mid basitarsus protuberant at base beneath *(Xanthosarus)* 21
Mandibles 4-dentate; mid basitarsus simple 22

21. Mid basitarsal protuberance narrow and keel-shaped .... *perihirta* Cockerell (p. 159)
Mid basitarsal protuberance robust, broad and quadrate .... *latimanus* Say (p. 157)

22(20). Mid tibia with a spur-like apical projection; lower margin of mandible with a median, acute angle or tooth ..... *(Pseudocentron) pruina* Smith (p. 167)
Mid tibia without an apical projection, either dilated or angulate, or not; lower margin of mandible lacking a median angle or tooth 23

23. Mid tibia dilated apically; front basitarsus not much produced apically, subequal in length to joints 2-5 combined *(Acentron) albitarsis* Cresson (p. 165)
Mid tibia not dilated apically, but inner margin slightly angulate just before apex; anterior margin of front basitarsus much produced apically *(Melanosarus)* 24

24. Mid and hind tarsi blackish .... *xylocopoides* Smith (p. 171)
Mid and hind tarsi ferruginous .... *bahamensis* Mitchell (p. 169)

25(19). Front basitarsi dilated, usually yellowish or ferruginous 26
Front basitarsi simple, blackish 35

26. Mandible 3-dentate; abdomen elongate and parallel-sided; claws usually with sharp, basal teeth *(Sayapis)* 27
Mandible 4-dentate; abdomen more robust; claws without basal teeth .... *(Delomegachile)* 30

27. Front basitarsal scale produced apically fully to tip of 3rd segment .... *policaris* Say (p. 176)
Apex of basitarsal scale not attaining tip of 3rd segment 28

28. Apex of basitarsal scale attaining tip of 2nd segment; anterior fringe on lower margin of scale black on basal third .. .. *pugnata* Say (p. 179)
Apex of basitarsal scale not attaining tip of 2nd segment; anterior fringe on lower margin of scale uniformly colored over entire length 29

29. Legs bright ferruginous ....*inimica inimica* Cresson (p. 174)
Legs dark..*inimica sayi* Cresson (p. 176)

30(26). Front basitarsi mostly blackish .... *gemula* Cresson (p. 134)
Front basitarsi pale in color 31

31. Median teeth on apical margin (not carina) of tergum 6 slender and spine-like ..... *melanophoea* Smith (p. 138)
Median teeth of tergum 6 not spine-like 32

32. Front basitarsi distinctly narrower than their tibiae *ingenua* Cresson (p. 137)

Front basitarsi equalling or exceeding their tibiae in width 33

33. Front basitarsi exceeding their tibiae in width, nearly as wide as long 34
Front basitarsi subequal to their tibiae in width, length much exceeding their width ..... *mucida* Cresson (p. 140)

34. Median abdominal terga with entire, white, apical fasciae .... *frigida frigida* Smith (p. 133)
Abdomen with only traces of white, apical fasciae, and then usually only on tergum 5 ..... *frigida appalachensis* Mitchell (p. 134)

35(25). Mandibles 4-dentate 36
Mandibles 3-dentate 38

36. Apical margin (not carina) of tergum 6 without conspicuous teeth; front coxae bare anteriorly, with a dense patch of red bristles anterior to each spine .... *(Delomegachile) addenda* Cresson (p. 131)
Apical margin of tergum 6 with four conspicuous teeth; front coxae pubescent anteriorly, lacking red bristles *(Argyropile)* 37

37. Larger (13 mm.); carina of tergum 6 broader, surface just above emargination broadly impressed .... *parallela* Smith (p. 159)
Smaller (10 mm.); carina of tergum 6 narrowed apically, slightly curved ventrad, emargination small, upper surface not impressed .... *townsendiana* Cockerell (p. 161)

38(35). Tergum 6 usually pale tomentose, apical margin (not carina) without evident teeth 39
Apical margin of tergum 6 with either median or lateral teeth, or both; tergum 5 at most with pale tomentum across base 41

39. Carina of tergum 6 entire laterad of the definite, median emargination; mid tooth of mandible slightly emarginated, mandible thus approaching a 4-dentate condition ..... *(Leptorachis) petulans* Cresson (p. 163)
Carina of tergum 6 denticulate laterally, obscuring the median emargination; mandibles distinctly 3-dentate *(Eutricharaea)* 40

40. Cheek below with an angulate process beneath base of mandible; lower margin of posterior face of front femora more or less distinctly rimmed with yellow toward apex; gonocoxites of genital armature largely bare, slightly dilated below apex .. *concinna* Smith (p. 121)
Cheek not angulate; front femora not rimmed with yellow; gonocoxites conspicuously setose apically, tips slender and strongly recurved dorsally .... (?) *rotundata* Fabricius (p. 122)

41(38). Tergum 7 produced medially to form a conspicuous apical spine; lateral teeth of apical margin (not carina) of tergum 6 conspicuous, median teeth inevident *(Sayapis)* .... *frugalis frugalis* Cresson (p. 173)
Tergum 7 not spinose; apical margin of tergum 6 with evident though small, median and lateral teeth, median pair carinate, lateral pair acute *(Litomegachile)* 42

42. Median teeth of apical margin of tergum 6 nearer each other than to the lateral teeth, or these distances subequal .... *mendica* Cresson (p. 117)
Median teeth of tergum 6 nearer the lateral teeth than to each other 43

43. Carina of tergum 6 quite deeply emarginate medially .... *texana* Cresson (p. 118)
Median emargination of carina of tergum 6 more indistinct, often obscured by the lateral irregular denticulations or crenulations 44

44. Pubescence of abdomen black in part ... ..*brevis pseudobrevis* Mitchell (p. 116)
Pubescence of abdomen entirely pale .... *brevis brevis* Say (below)

Megachile (Litomegachile) brevis brevis Say

(Figs. 36-38)

Megachile brevis Say, 1837. Boston Jour. Nat. Hist. 1, p. 407. ♂ ♀.

Megachile languinosa Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 190. ♀ ♂.

? *Megachile nupta* Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 268. ♀.

Megachile perbrevis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♂.

Megachile brevis Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 39. (biology)

Megachile brevis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile brevis Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 220. (biology)

Megachile (Litomegachile) brevis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 13.

Megachile (Litomegachile) brevis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1057. (larva)

Megachile (Litomegachile) brevis brevis Michener, 1953. Kans. Univ. Sci. Bul. 35, pp. 1659-1748. (biology)

FEMALE—Length 9-12 mm.; black, including tegulae and legs, spurs yellowish; eyes slightly convergent below; clypeal margin nearly straight, median third narrowly shining and impunctate; mandibles 4-dentate, with bevelled edges between 2nd and 3rd, 3rd and 4th (fig. 38); lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly narrower than eyes; punctures deep, distinct and rather coarse, well separated between eyes and ocelli and on clypeus and supraclypeal area medially, closer between ocelli, across upper part of face, below ocelli and on lateral margins of clypeus, finer and more shallow and vague on cheeks; pubescence white, rather copious around antennae and inner orbits on cheeks, especially below, and on thorax laterally and posteriorly, largely black on vertex, scutum and scutellum; punctures of scutum close, moderately coarse, slighty separated across disc medially, those on axillae and scutellum somewhat closer and finer, shallow and rather densely crowded on pleura, propodeum somewhat smoother, punctures very fine, shallow and indistinct; mid and hind basitarsi nearly as broad as their tibiae; tegulae minutely and rather closely punctate; wings sub-hyaline, becoming faintly clouded along apical margin, veins piceous; abdominal terga 2-5 shallowly grooved or depressed toward basal margin, apical margins more abruptly depressed laterally, rims very narrowly yellowish-hyaline; basal tergum with copious, elongate, erect, whitish pubescence, discal pubescence of tergum 2 somewhat shorter but entirely whitish, that on 3-5 black in part, 2-5 with entire, whitish, apical fasciae; punctures close and fine on terga 1 and 2, somewhat more widely separated on 3-5, 6 distinctly concave in profile, with rather abundant, erect pubescence, blackish toward base becoming pale apically; sternum 6 well covered with scopal hairs, these largely pale, apical margin with a dense fringe of short, more fuscous hairs, scopa yellowish-white, sternal plates quite coarsely and closely punctate, narrowly yellowish-hyaline apically.

MALE—Length 7-9 mm.; black, including tegulae and legs, spurs testaceous; eyes slightly convergent below; cheeks somewhat narrower than eyes; clypeal margin obscured by a dense, elongate, white fringe, nearly straight, but median area very slightly incurved; mandibles conspicuously 3-dentate, with an acute, sub-basal inferior process; apical segment of flagellum narrow and elongate; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; punctures deep and distinct, but not very coarse, rather close across vertex, and between eyes and ocelli, becoming very fine, close and obscure on the more shining cheeks, rather coarse and quite closely crowded below ocelli, but becoming minute and densely crowded on supraclypeal area and sides of face beneath pubescence, but upper half of clypeus with distinct, rather coarse and quite close punctures evident, these becoming minute and densely crowded apically where surface is obscured by pubescence; pubescence largely pale on head and thorax, with only a few more yellowish hairs interspersed on vertex and scutum; pubescence quite copious and erect around antennae, on sides of face and on clypeus apically, elongate and quite copious on cheeks below and on thorax laterally and posteriorly, somewhat thinner but erect and quite copious on vertex and dorsum of thorax; punctures quite deep, distinct and close over most of scutum and scutellum, relatively fine, slightly separated along mid-line of scutellum, quite densely crowded and fine on pleura, propodeum somewhat more shining; front coxal spines well developed but rather short, subacute, quite densely long pubescent; mid tibial spurs well developed; all basitarsi much narrower than their tibiae; tegulae minutely and rather closely punctate; wings subhyaline, veins brownish to piceous; abdominal terga 2-4 quite deeply depressed toward basal margin, apical margins narrowly and abruptly depressed, more deeply so laterally except on 4, margins narrowly yellowish-hyaline, and yellowish or whitish fasciate, discal pubescence copious and erect on terga 1 and 2, somewhat shorter but erect and rather conspicuous on 3-5; terga 1 and 2 very closely and finely punctate, punctures more distinctly separated and somewhat coarser on 3 and 4, quite coarse and close over 5 which has a thin, basal yellowish or whitish, tomentose band and a dense, apical, entire fascia of the same color; tergum 6 whitish tomentose in large part dorsally, carina with a small, median emargination, which is obscured by the irregular, more lateral crenulations, median teeth of apical margin nearer lateral teeth than to each other; sterna 1-4 exposed, apical margins depressed and yellowish-hyaline, conspicuously fringed with elongate, pale hairs, punctures close and fine on 1 and 2, somewhat coarser and more widely separated on 3 and 4; setose area of sternum 5 extensive (fig. 36), exceedingly minute; sternum 6 with numerous, scattered, robust setae on each side, apical lobe broad and short, not acutely angulate; gonocoxities constricted above base, compressed apically, the apex acute (fig. 37).

DISTRIBUTION—This is one of the most widely occurring species of bees in North America, ranging from the Atlantic to the Pacific, both in the United States and in southern Canada, throughout the season.

FLOWER RECORDS—*Asclepias, Astragalus, Bidens, Chrysanthemum, Erigeron, Fagopyrum, Gossypium, Haplopappus, Helianthus, Hieraceum, Hypericum, Kuhnistera, Lupinus, Medicago, Melilotus, Ocimum, Oenothera, Phaseolus, Polygonum, Psoralioides, Rhus, Rubus, Salvia, Solidago, Stachys, Suriana, Tephrosia, Trifolium* and *Vicia.* The following additional genera are listed by Robertson (1929): *Abutilon, Acerates, Amorpha, Apios, Aster, Blephilia, Boltonia, Brauneria, Campanula, Cassia, Ceanothus, Cephalanthus, Cicuta, Coreopsis, Cornus, Cynoglossum, Desmodium, Dianthera, Erechthites, Eryngium, Eupatorium, Gerardia, Helenium, Heliopsis, Hibiscus, Hydrophyllum, Impatiens, Krigia, Lactuca, Lepachys, Lespedeza, Lineria, Lippia, Lobelia, Ludvigia, Lycopus, Lythrum, Marrubium, Nepeta, Pentstemon, Petalostemum, Physostegia, Psoralea, Pycnanthemum, Rosa, Rudbeckia, Ruellia, Sabatia, Sagittaria, Scutellaria, Silphium, Strophostyles, Teucrium, Tradescantia, Verbena* and *Verbesina.*

Megachile (Litomegachile) brevis pseudobrevis Mitchell

Megachile (Litomegachile) brevis var. *pseudobrevis* Mitchell, 1936. Amer. Ent. Soc. Trans. 61, p. 20. ♀ ♂.

Megachile (Litomegachile) pseudobrevis Michener, 1947. Amer. Midland Nat. 38, p. 450. (taxonomy)

Although this has been accorded specific status by Michener (1947), the occurrance of intergrading forms in the southeast convinces us that it is more properly to be considered subspecific in rank. It agrees with typical *brevis* in all structural details, the chief difference being that in the female the scopa of sternum 6 is black, and the black pubescence is more conspicuous on the vertex, scutum and the more apical, abdominal terga, including tergum 6. In the male, the discal pubescence of terga 3-5 is to a considerable degree black. In typical *brevis* the scopa is white on sternum 6, with only the apical, dense fringe of hairs at all dark, and in the male the pubescence of the abdomen is almost entirely pale. Specimens collected in the Northeast usually fit the description of typical *brevis*, while in the Southeast, especially along the Coastal Plain and into Florida, *pseudobrevis* is the prevalent form.

DISTRIBUTION—Florida to North Carolina; April to October, in Florida, March to December.

FLOWER RECORDS—*Afzelia, Chrysopsis, Erigeron, Galactia, Helenium, Helianthus, Lupinus, Melilotus, Opuntia, Polygonum, Rhus, Rubus, Solidago, Suriana, Trilisa* and *Vaccinium.* Michener (1947) records this subspecies on *Gaylussacia.*

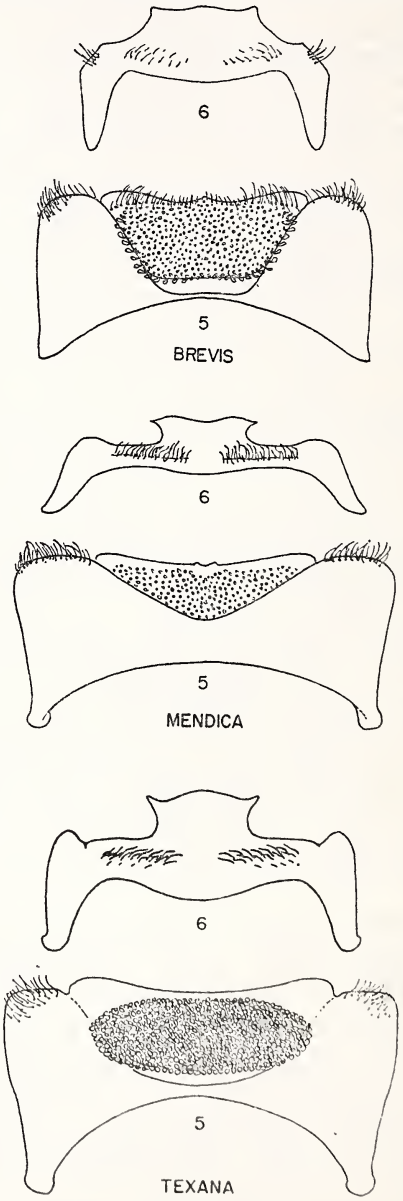


Figure 36
Sterna 5 and 6 in males of *Megachile (Litomegachile).*

Megachile (Litomegachile) mendica Cresson

(Figs. 36-38)

Megachile mendica Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 126. ♀.
Megachile mendica Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 39. (biology)
Megachile mendica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Litomegachile) mendica Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 26.
Megachile (Litomegachile) mendica mendica Michener, 1947. Amer. Midland. Nat. 38, p. 449. (flower records)
Megachile mendica Koerber and Medler, 1958. Wisc. Acad. Sci., Arts and Letters 47, p. 56. (biology)

FEMALE—Length 11-13 mm.; black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight and entire; mandibles 4-dentate, but emargination between 3rd and 4th teeth slightly angulate, bevelled edges between 2nd and 3rd, and 3rd and 4th (fig. 38); lateral ocelli subequally distant from eyes and margin of vertex; cheeks below subequal to eyes in width, narrowed above; punctures deep and distinct, rather fine, quite close but not crowded across vertex, becoming more fine, shallow and close on cheeks, face below ocelli more rugose, clypeus and supraclypeal area shining, punctures well separated medially, becoming quite close on each side; pubescence whitish, quite copious and rather elongate around antennae and along inner margins of eyes, on cheeks below, becoming rather thin above, and over lateral and posterior areas of thorax, the vertex, scutum and scutellum largely black pubescent; scutum and scutellum rather dull, punctures in general fine and crowded, slightly separated in center of scutum, quite densely crowded on axillae, scutellum and pleura, propodeum somewhat smoother; mid and hind basitarsi slightly narrower than their tibiae; tegulae minutely and rather closely punctate; wings sub-hyaline, veins piceous; abdominal terga 2-5 shallowly grooved across base, basal margin of the groove slightly carinate and complete, apical margins narrowly depressed laterally but not medially, narrowly white fasciate, fasciae more or less interrupted on the more basal terga, discal pubescence short, erect, rather dense, entirely black on terga 2-5, basal tergum with rather thin but long and erect, entirely pale pubescence, without a distinct apical fascia; terga shining, punctures fine and well separated medially, becoming somewhat closer laterally; tergum 6 straight in profile, with no erect hairs evident, but some erect, rather sparse pubescence evident toward sides in dorsal view, surface very densely and finely punctate and more or less covered with fuscous, appressed tomentum; sternum 6 rather thinly covered with scopal hairs, the more apical of these black, scopa otherwise yellow; sterna 1 and 2 quite closely, uniformly punctate, 3-5 more coarsely and sparsely so, apical margins very narrowly yellowish-hyaline.

MALE—Length 8-10 mm.; entirely black, including tegulae and legs, spurs yellow; eyes slightly convergent below; clypeal margin nearly straight, but median third very slightly produced, shining and impunctate, very slightly incurved; mandible 3-dentate (fig. 38), with a triangular, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks very slightly narrower than eyes; punctures deep and distinct, rather fine, slightly separated across vertex, becoming somewhat finer and more shallow and vague on cheeks, densely crowded below ocelli, entire face around and below antennae densely and finely rugose beneath dense pubescence which completely hides surface; pubescence of face yellowish-white, that on cheeks greyish-white, quite copious and elongate below, greyish-white on thorax laterally and posteriorly, becoming somewhat more yellowish and with a few, intermixed, dark hairs on vertex and scutum; scutum dull, punctures rather fine and densely crowded except near center where they are very slightly separated, those on axillae and scutellum very densely crowded; pleura dull, subrugose, punctures closely crowded; propodeum somewhat smoother, with close minute, shallow and obscure punctures; front coxal spines well developed, quite slender and elongate, densely long pubescent posteriorly; mid tibial spurs rather short but well developed; all basitarsi much narrower than their respective tibiae; tegulae shining, very minutely and rather closely punctate; wings subhyaline, veins more brownish-piceous; abdominal terga 2-4 rather deeply grooved toward base of each, apical margins very narrowly depressed, especially laterally, very narrowly yellowish-hyaline; punctures of terga 1 and 2 very fine and close, uniform, somewhat coarser and well separated medially on 3 and 4, becoming slightly closer laterally, apical margin of 4 depressed across entire width; tergum 5 narrowly pale tomentose across base, apical margin very deeply and narrowly depressed, not fasciate, punctures rather coarse and close throughout; tergum 6 densely pale tomentose medially, carina with a deep, evenly rounded emargination, margin on each side very minutely crenulate, median teeth of apical margin fully as near each other as each one is to the lateral tooth;

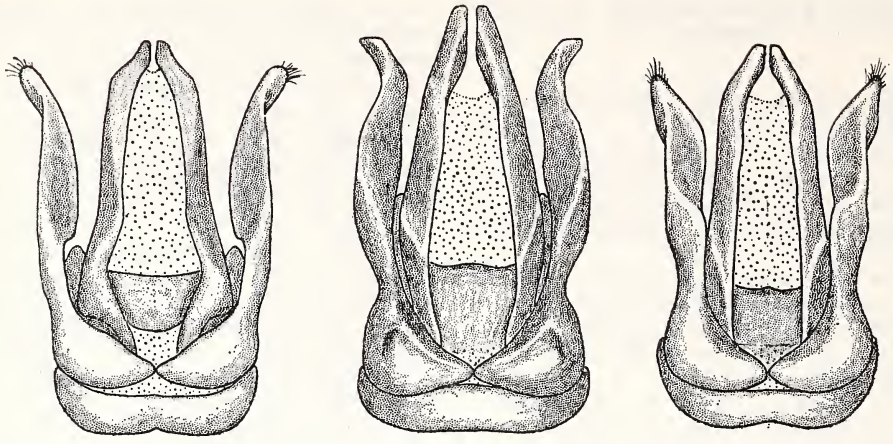


Figure 37—Genital armatures in males of *Megachile (Litomegachile)*

setose area of sternum 5 restricted, setae minute (fig. 36); sternum 6 with a single, transverse row of robust, curved setae on each side, other setae minute, apical lobe broad and short, lateral angles acute; gonocoxites of genital armature narrowed above base, compressed apically, apex subacute and flexed (fig. 37).

DISTRIBUTION—This is a widely distributed species in the United States, occurring from coast to coast, and from Maine to Florida in the East. It is in flight throughout the season.

FLOWER RECORDS—*Amorpha, Aralia, Asclepias, Aster, Baptisia, Bidens, Borrichia, Ceanothus, Cephalanthus, Chrysanthemum, Chrysopsis, Cicuta, Cirsium, Clematis, Cosmos, Crataegus, Crotalaria, Daucus, Erigeron, Eriogonum, Eupatorium, Flaveria, Galactia, Gerardia, Haplopappus, Helenium, Helianthus, Hypericum, Ilex, Itea, Linaria, Medicago, Melilotus, Monarda, Nyssa, Ocimum, Oenothera, Opuntia, Phaseolus, Polygonum, Rhus, Richardia, Rubus, Rudbeckia, Senecio, Solidago, Specularia, Spiraea, Stachys, Suriana, Tephrosia, Trifolium, Trilisa, Vaccinium, Veronica, Vicia* and *Zinnia*. Additional records by Robertson (1929) include the following: *Acerates, Agastache, Apios, Blephilia, Boltonia, Brauneria, Camassia, Cassia, Coreopsis, Desmodium, Diospyros, Eryngium, Gaura, Impatiens, Lepachys, Lespedeza, Lycopus, Lythrum, Nepeta, Prunella, Psedera, Psoralea, Pycnanthemum, Rosa, Salix, Silphium, Strophostyles, Symphoricarpus, Teucrium, Verbena* and *Verbesina*. Three additional records are given by Michener (1947), *Cyrilla, Gaylussacia* and *Pyrrhopappus*.

Megachile (Litomegachile) texana Cresson

(Figs. 36 & 37)

Megachile texana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 125. ♂. (♀ misdet.)
Megachile generosa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 125. ♀.
Megachile schizmatura Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 1, p. 267. ♂.
Megachile vernonensis Cockerell, 1912. Canad. Ent. 44, p. 354. "♀" = ♂.
Megachile generosa Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 38. (biology)
Megachile generosa Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Litomegachile) texana Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 32.
Megachile (Litomegachile) texana texana Michener, 1947. Amer. Midland Nat. 38, p. 449. (flower records)
Megachile texana Krombein, 1953. Ent. Soc. Wash. Proc. 55, p. 84. (biology)

FEMALE—Length 11-14 mm.; entirely black, including tegulae and legs, spurs yellowish; eyes very slightly convergent below; clypeal margin straight and simple; mandibles distinctly 4-dentate, bevelled edges between 2nd and 3rd and between 3rd and 4th; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes;

punctures quite deep and distinct. rather fine, well separated across vertex, becoming somewhat more fine, shallow, close and obscure on cheeks, very close and deep below ocelli, very fine and densely crowded beneath dense pubescence along inner margins of eyes, slightly separated on clypeus and supraclypeal area medially, becoming somewhat closer laterally; pubescence whitish, rather short but dense around antennae and along inner margins of eyes, on cheeks, below, becoming somewhat short and thinner above, short but rather dense on thorax laterally and posteriorly, black on vertex, and over most of scutum and scutellum, scutello-mesothoracic suture with some very fine, obscure, pale tomentum, and scutum with some whitish pubescence anteriorly; scutum dull, punctures rather fine, irregular, well separated in center, and to some degree between notaulices and tegulae, becoming very close antero-laterally and along posterior margin; punctures slightly separated in median area of scutellum, becoming finer and densely crowded laterally and on axillae; pleura very finely and densely punctate above, becoming somewhat more coarsely and distinctly so below; propodeum somewhat smoother, punctures very minute, close and obscure; mid and hind basitarsi nearly as broad and about as long as their tibiae; tegulae very minutely and closely punctate; wings subhyaline, faintly clouded apically, veins piceous; abdominal terga 2-5 with complete, transverse, basal grooves, basal margin of each distinctly carinate, apical margins rather deeply depressed laterally, less so medially, margins very narrowly hyaline and completely white fasciate, fasciae thin medially, becoming broader and dense laterally; discal pubescence short but erect, entirely black, basal tergum with some blackish pubescence on each side, otherwise relatively pale, apical fascia very thin but complete; punctures fine, very close on terga 1 and 2, becoming more distinctly separated on 3-5, somewhat coarser and more sparse toward apical margin of each plate; tergum 6 distinctly concave in profile, with abundant, erect pubescence evident, this largely black, with the more apical pubescence subappressed and pale, punctures very fine and densely crowded; sternum 6 rather well covered with black scopal hairs, with a dense, apical fringe of very short, blackish hairs, scopa otherwise yellowish-white, becoming black only at extreme sides of sternum 5; sterna closely and deeply punctate, very finely so on the more basal plates, becoming more coarse and sparse on the more apical plates.

MALE—Length 10-12 mm.; entirely black, including tegulae and legs, spurs yellowish; eyes very slightly convergent below; clypeal margin very slightly produced medially, this area narrowly polished and impunctate, very slightly incurved; mandibles 3-dentate, with a triangular, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures deep and distinct, rather coarse and well separated across vertex; becoming finer, closer and more obscure on cheeks, those below ocelli coarse and contiguous, lateral areas of face and supraclypeal area finely and densely rugose beneath dense pubescence, upper margin of clypeus coarsely and very closely punctate, punctures becoming minute and dense toward apical margin; pubescence around antennae and over lower half of face creamy-white, dense and quite elongate, more snowy-white and copious on cheeks below, becoming thin above, white on thorax laterally and posteriorly, black on vertex and on central area of scutum, with a few, erect, black hairs on scutellum; punctures of scutum close and rather coarse, slightly separated only in median area of disc, very close on scutellum and densely crowded on axillae; pleura dull, punctures densely crowded, propodeum somewhat more shining, with shallow and rather vague punctures evident; front coxal spines rather short but well developed, narrowly rounded apically, densely long pubescent posteriorly; mid tibial spurs short but well developed; all basitarsi relatively slender and short; tegulae very minutely and quite closely punctate; wings subhyaline, veins more piceous; abdominal terga 1-4 rather deeply grooved across base, basal margin of groove conspicuously carinate, apical margins of terga narrowly depressed, deeply so toward sides across entire width of the more apical terga, with entire, white fasciae which are dense laterally, quite thin or interrupted medially; discal pubescence entirely pale, elongate, quite erect and conspicuous, on tergum 1, shorter on the following segments, blackish toward apical margin of each; punctures fine and close on terga 1 and 2, more distinctly separated on 3 and 4, rather coarse and somewhat closer on 5, apical margins of discs of 4 and 5 considerably overhanging the depressed apical rims laterally; tergum 6 quite broadly and densely whitish tomentose above, carina with a deep, semicircular, median emargination, margins on each side subentire, median teeth of apical margin considerably nearer lateral teeth than to each other; sterna 1-4 exposed, shining, rather closely and coarsely punctate on the more basal plates, becoming rather sparse on the more apical plates, apical margins depressed, yellowish-hyaline, quite densely fasciate on 2 and 3; setose area of sternum 5 rather restricted, rounded laterally, finely setose (fig. 36); sternum 6 with widely separated, more or less linear, trans-

verse areas of robust, curved setae; gonocoxites constricted above base, compressed apically, apex acute and flexed (fig. 37).

DISTRIBUTION—This is another widely distributed species, ranging from the Atlantic to the Pacific in the United States and southern Canada, and is in flight throughout the season.

FLOWER RECORDS—*Afzelia, Asclepias, Baptisia, Crotalaria, Elephantopus, Eupatorium, Galactia, Helenium, Kuhnistera, Liatris, Medicago, Melilotus, Opuntia, Oxydendrum, Phaseolus, Rhus, Rubus, Silphium, Stachys, Tephrosia, Trifolium* and *Vicia.* Robertson (1929) lists the following: *Acerates, Aster, Blephilia, Dianthera, Helianthus, Nepeta, Psoralea, Pycnanthemum, Strophostyles* and *Verbena.* Michener (1947) gives two additional records, *Pyrrhopappus* and *Serinea.*

Megachile (Eutricharaea) apicalis Spinola

Megachile apicalis Spinola, 1808. Insectorum Liguriae 2, p. 259. ♀.
Megachile mixta Costa, 1863. Accad. delle Sci. Fis. e Mat. Napoli. Atti 1 (2), p. 44. ♀.
Megachile dimidiati-ventris Dours, 1873. Rev. Mag. Zool. (3) 1, p. 300. ♀.
Megachile virginiana Mitchell, 1926. Amer. Ent. Soc. Trans. 52, p. 113. ♀.
Megachile (Eutricharaea) apicalis Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 417.

FEMALE—Length 8 mm.; black, including legs, tegulae more brownish-piceous, spurs pale yellow; eyes very slightly convergent below; clypeal margin distinctly angulate medially, shallowly incurved on each side of this; mandibles 4-dentate, but with a slight angle and a low bevelled edge between 3rd and 4th teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks much narrower than eyes; vertex deeply and distinctly but closely and rather finely punctate, punctures becoming finer and closer on cheeks above, rather coarse and irregular below; face below ocelli rather coarsely rugoso-punctate, becoming somewhat more finely so laterally, median area of supraclypeal area shining and impunctate, becoming very closely punctate laterally, clypeus with a median, sparsely punctate, shining line, finely and densely punctate on each side; pubescence greyish-white on face and cheeks, rather copious around antennae, on face laterally and on cheeks below, becoming short but rather dense above, vertex with thin, erect and somewhat darker hairs; thorax rather short, pale pubescent laterally and posteriorly, quite densely so around tubercles and behind wing bases, scutum with largely pale more erect, very sparse, short and obscure pubescence, that on scutellum somewhat more elongate and erect; dorsum of thorax very closely and rather coarsely punctate throughout, pleura with much coarser, contiguous punctures below, becoming finer but densely crowded above; lateral faces of propodeum somewhat smoother but with close, shallow and fine punctures, posterior face somewhat more shining, punctures very minute and quite vague; mid and hind basitarsi about as broad but distinctly shorter than their tibiae, front tarsi relatively slender and simple; tegulae very finely and quite closely punctate; wings subhyaline, slightly clouded apically, veins piceous; abdominal terga 2 and 3 with very shallow, transverse, basal grooves or impressions, these only subcarinate at most, apical margins of 2-5 rather deeply depressed laterally, but not at all medially, densely white fasciate toward sides, but these widely interrupted or very narrow medially; basal tergum with rather copious, elongate, pale pubescence which does not obscure surface, becoming very densely pale tomentose laterally, with a very narrow, apical, connecting fascia; discal pubescence of terga 2-5 very short, rather obscure, largely fuscous, hairs becoming slightly more conspicuous but more sparse apically, punctures of 1 and 2 rather fine and close medially but disc of 2 with a dull sublateral area where they are obscure or absent, those of 3-5 somewhat more coarse and sparse, quite irregular, becoming somewhat finer and closer in the depressed apical margins; tergum 6 about straight in profile, with numerous, suberect, fuscous hairs evident, broadly rounded apically in dorsal view, pubescence entirely dark, surface very minutely and quite closely punctate; scopa pale yellowish on sterna 2-4, black on 5 and 6, the more basal sterna very finely and closely punctate, punctures becoming somewhat coarser and less close on the more apical terga, apical margins narrowly depressed, with conspicuous, white fasciae.

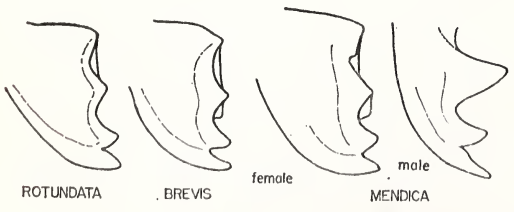


Figure 38
Mandibles in species of *Megachile (Litomegachile)* and *M. (Eutricharaea).*

MALE—This sex is so nearly identical with the male of *rotundata* that the two are nearly

impossible to separate with any degree of confidence.

DISTRIBUTION — Records of this species in North America are few, but at least some of them seem to be quite positive. Two females have been collected in Virginia, the last one in 1931, by Timberlake. A female has been seen labelled "Canada," and a male, possibly this species, bears the label "New Jersey." A female, bearing no locality data, according to the label was dug from the ground July 12, 1883. It is not clear, therefore, that it has been entirely successful in becoming established on this continent. In the Old World it occurs in Europe and the Mediterranean region.

FLOWER RECORD—*Centaurea cyanus.*

Megachile (Eutricharaea) concinna Smith

(Fig. 39)

Megachile concinna Smith, 1879. Descr. N. Sp. Hym., p. 79, n. 53. ♀.

Megachile (Eutricharaea) argentata Krombein, 1958. Hym. Amer. North of Mex., Syn. Cat., U.S.D.A. Agr. Monog. 2, First Suppl., p. 244. (misident.)

FEMALE—Length 9 mm.; black, including legs, tegulae yellowish anteriorly, spurs entirely yellow; eyes slightly convergent below; clypeal margin straight and entire; mandibles 4-dentate, a bevelled edge between the 3rd and 4th teeth; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks much narrower than eyes; vertex rather dull, punctures slightly separated on each side, but otherwise densely crowded, becoming very fine and indistinct on cheeks, rather coarse just below base of mandibles; face quite densely rugoso-punctate below ocelli, becoming more distinct but very fine and close laterally, supraclypeal area with shining spaces between rather sparse punctures just above clypeus but becoming closely punctate laterally, clypeus with a rather distinct, impunctate, median line, closely and deeply punctate on each side; pubescence of face yellowish-white, rather dense but not very long around antennae, below ocelli and along inner orbits, clypeus and vertex with erect and rather sparse, yellowish hairs, cheeks densely white tomentose above, pubescence becoming more elongate and erect below; thorax with rather short, whitish pubescence laterally and posteriorly, this rather dense around tegulae and back of wing bases, somewhat more elongate on propodeum; scutum with rather thin, short but erect, more fuscous or yellowish pubescence, becoming whitish anteriorly, scutellum with longer, erect, yellowish hairs, the scutellomesothoracic suture faintly tomentose; dorsum of thorax uniformly, densely and finely punctuate throughout; pleura somewhat shining below, punctures distinct but rather close, becoming densely crowded above; lateral faces of propodeum rather dull, surface with numerous, close but fine punctures, posterior face dull, punctures minute, close and rather vague; mid and hind basitarsi nearly as broad as their tibiae, but definitely shorter, the front tarsi quite slender; tegulae minutely and rather obscurely punctate; wings subhyaline, veins piceous; abdominal terga 2 and 3 very shallowly grooved across base, the grooves hardly carinate, apical margins of terga rather deeply depressed laterally but only slightly so medially if at all, with entire, whitish, apical fasciae, these quite dense laterally; basal tergum with rather thin, elongate, pale pubescence, discal pubescence of 2-4 very short, largely fuscous, that on 5 somewhat more elongate and conspicuous apically; punctures of terga 1-4 rather deep and distinct but fine and close, becoming somewhat more sparse toward apical margin of 5, 6 straight in profile, with numerous dark, suberect hairs visible, surface very finely and densely punctate, usually with a more or less extensive patch of pale tomentum; scopa pale yellowish or whitish on sterna 2-5, black on 6, with a few black hairs at sides of 5, punctures of sterna deep, distinct and rather close and fine, apical margins narrowly depressed, with entire, white, apical fasciae.

MALE—Length 7 mm.; black, tegulae more or less yellowish-testaceous, spurs yellow, legs largely black; eyes slightly convergent below; median third of clypeus slightly produced and shallowly incurved; mandibles 3-dentate, inferior process submedian, rather slender and acute; apical segment of flagellum slender and unmodified; lateral ocelli slightly nearer margin of vertex than to eyes; cheeks considerably narrower than eyes, still narrower below, with a small, acute tubercle just below base of mandible; vertex dull, punctures well separated on each side but densely crowded medially, very fine and quite close on cheeks, face below ocelli densely rugoso-punctate, becoming more distinctly but very closely punctate laterally, punctures minute and densely crowded below antennae and on clypeus; face with dense, yellow or yellowish-white pubescence which largely hides surface, more whitish on cheeks, somewhat yellowish and rather dense above, becoming elongate below, rather thin, erect and sparse on vertex; pubescence of thorax short, quite dense, white or yellowish laterally and posteriorly, more erect but rather

thin, either yellowish or whitish dorsally, the scutello-mesothoracic suture narrowly tomentose; dorsum of thorax uniformly, finely and densely punctate, pleura somewhat shining below, punctures distinct but quite close, becoming densely crowded above; lateral faces of propodeum relatively smooth, with only very fine and rather close punctures, posterior face dull, punctures minute, rather close above, becoming sparse below; front coxal spines rather short, subtriangular, apex narrowly rounded, quite densely pubescent, and anterior surface of coxae pubescent, more or less obscuring the spines; front tarsi dark, simple and unmodified, with a quite distinct but rather short, posterior, white fringe; front femora more or less carinate below apically, inner face of this area yellow and carinate border of the posterior face narrowly yellow, femora otherwise dark; mid and hind tarsi slender and simple; mid tibial spurs well developed; tegulae minutely and obscurely punctate; wings subhyaline, veins piceous; abdominal terga 2-5 rather narrowly grooved across base, basal margins subcarinate, apical margins of the terga rather deeply depressed, especially laterally, only obscurely so medially, 2-4 with dense, apical, whitish or yellowish fasciae; tergum 1 with rather copious, elongate and erect, yellowish or whitish pubescence, somewhat obscurely pale fasciate apically, tergum 2 with shorter but quite dense and erect pale pubescence, with some dark hairs at extreme sides, discal pubescence of 3 and 4 suberect, largely pale, very fine and obscure; tergal punctures very fine and close throughout; tergum 5 fasciate basally but not apically, rather coarsely rugoso-striate, with suberect, rather conspicuous, largely pale pubescence; tergum 6 densely pale tomentose throughout, only the median, emarginate area of the low, inconspicuous carina exposed, median teeth of apical margin inevident, lateral angles very low and obscure; tergum 7 very low, transverse, largely hidden, not at all produced medially; sterna 1-4 exposed, quite closely and finely punctate, apical margins depressed, with dense, pale, apical fasciae; setose area of sternum 5 quite limited in area, subtriangular, apical margin nearly straight, setae very fine, becoming rather elongate apically (fig. 39); sternum 6 with narrow, transverse, setose lobes on each side that are slightly separated medially, apical lobe inevident; gonocoxites narrowed above base, compressed toward apex, somewhat abruptly narrowed just before the rounded tips which are slightly emarginate below, lacking conspicuous setae.

DISTRIBUTION — Although *concinna* was described from the West Indies, it belongs to an Old World group and probably was introduced from Africa during the early part of the nineteenth century. It appeared in the United States after World War II, and is now distributed from Florida and Alabama to Pennsylvania and Ohio in the East, and established as far west as California. It was first believed by this writer to be *argentata*, which explains the misidentification in the Catalog of Hymenoptera (Krombein, 1958). It is in flight from March, in Florida, to October.

FLOWER RECORDS—In North America this has been collected on *Asclepias, Bidens, Melilotus* and *Polygonum.*

Megachile derelictula Cockerell (Barbados) and *Megachile multidens* Fox (Jamaica) are very similar to *concinna* and quite possibly synonymous.

Megachile (Eutricharaea) ? rotundata (Fabricius)

(Figs. 38 & 39)

Apis rotundata Fabricius, 1787. Mantissa Insectorum 1, p. 303.
Apis pacifica Panzer, 1798. Faunae Ins. German. 55, p. 16.
Megachile imbecilla Gerstaecker, 1869. Stettin. Ent. Ztg. 30, p. 359. ♀.
Megachile (Eutricharaea) rotundata Krombein, 1948. Ent. Soc. Wash. Proc. 50, p. 14.
Megachile (Eutricharaea) rotundata Stephen and Torchio, 1961. Pan-Pacific Ent. 37, p. 85. (biology)

FEMALE—Length 8-9 mm.; black including legs, the tegulae more brownish-testaceous, spurs yellow; eyes very slightly convergent below; clypeal margin nearly straight, with a very shallow and rather short, incurved, or emarginate area on each side of center; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth, where the margin is very slightly angulate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly narrower than eyes; punctures of vertex fine and close but quite deep and distinct, becoming somewhat more shallow and obscure on cheeks, irregularly so below; face below ocelli densely rugose, supraclypeal area closely and rather coarsely punctate on each side, with some shining, impunctate spaces apically in center, clypeus with a very narrow, obscure, shining and sparsely punctate median line, punctures on each side rather coarse and densely crowded; pubescence yellowish-white, rather short on face and cheeks, rather dense around antennae and on face laterally, thin, erect and rather elongate on vertex, hairs yellowish or dark; pubescence of cheeks more whitish, short above, somewhat more elongate

below; thorax short, white pubescent laterally and posteriorly, quite densely so around tubercles and behind wing bases, more yellowish, very short and inconspicuous on scutum, scutellum with more elongate, erect, yellowish hairs; dorsum of thorax densely punctate throughout, punctures rather coarse in center, punctures of pleura somewhat shallower but contiguous, becoming somewhat finer and crowded above; lateral faces of pleura somewhat shining, very minutely and quite closely punctate, posterior face somewhat more shining, punctures irregular, minute and vague; all basitarsi shorter and somewhat narrower than their tibiae; tegulae with only a few, scattered, minute and obscure punctures; wings subhyaline, veins piceous; abdominal terga 2 and 3 very shallowly grooved across base, these not carinate, apical margins of 2-5 rather abruptly depressed laterally but not medially, with entire, whitish, apical fasciae that are quite dense laterally, narrow medially; tergum 1 with rather copious but thin, elongate, whitish pubescence that is rather dense laterally, 2-4 with very short, fuscous, discal pubescence, 3-6 with conspicuous, black hairs evident on each side in dorsal view; punctures fine and close on the more basal terga, disc of 2 with a dull, sublateral, impunctate area; punctures of 3-5 quite deep, distinct, and well separated; tergum 5 quite similar to 4, 6 nearly straight in profile, with numerous, suberect, fuscous hairs evident, without pale tomentum, surface very finely and quite densely punctate; scopa entirely pale on sterna 2-4, pale basally but more or less black apically and laterally on 5, entirely black on 6; the more basal sterna very closely and rather finely punctate, punctures becoming somewhat more coarse and sparse on the more apical sterna, apical margins narrowly depressed, distinctly white fasciate.

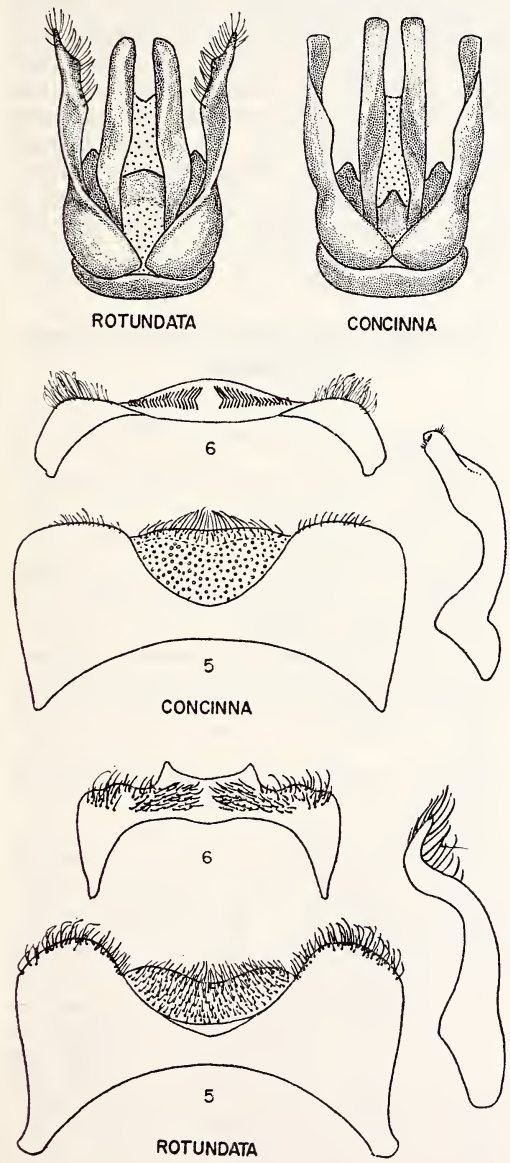


Figure 39
Genital armature and sterna 5 and 6 in males of *Megachile (Eutricharaea).*

MALE—Length 7-8 mm.; black, tegulae somewhat more brownish or testaceous, front tarsi in part yellowish, spurs yellow; eyes very slightly convergent below; median third of clypeal margin very slightly incurved; mandibles 3-dentate, inferior process sub-basal, slender and acute; apical segment of flagellum slender and simple; lateral ocelli subequally distant from eyes and margin of vertex; cheeks considerably narrower than eyes; vertex rather dull, punctures very close, rather fine but deep and distinct, these becoming somewhat finer and more shallow on cheeks; face below ocelli rather finely rugoso-punctate, clypeus very finely and densely rugose; pubescence of face and vertex yellow, dense around antennae and over lower portion of face, supraclypeal area with very dense, subappressed, upwardly directed hairs that completely hide surface, clypeal pubescence more erect, slightly downcurved at tips, but largely obscuring surface, that on vertex thin and erect, yellowish on cheeks above, becoming white, very long and dense below; pubescence of thorax more whitish, quite dense laterally and posteriorly, yellowish or whitish on dorsum, more elongate and erect on scutellum; dorsum of thorax dull, surface densely and finely rugoso-punctate, punctures of pleura somewhat coarser but densely crowded; lateral faces of propodeum rather smooth, with only exceedingly minute, vague punctures, posteri-

or face somewhat more shining, with minute, vague and sparse punctures; front coxal spines spatulate, rather broad and quite short, densely white pubescent posteriorly, coxae rather densely white pubescent laterally but largely bare toward inner side, no red bristles evident; front tarsi slender and simple, with a very short but rather dense, posterior fringe, segments 2 and 3 yellow at base, 4 and 5 largely yellow; front tibiae dark, and front femora largely dark on posterior face, apical half of anterior face quite conspicuously yellow, lower margin only obscurely carinate and yellow not invading margin of posterior face; mid tibial spurs well developed, mid and hind tarsi slender and simple; tegulae minutely and closely punctate; wings subhyaline, somewhat clouded apically, veins piceous; basal grooves of abdominal terga very shallow, subcarinate, apical margins of 2-5 rather deeply depressed laterally but not medially, with dense, complete, whitish or yellowish fasciae; basal tergum with copious, erect, entirely pale pubescence, becoming very dense laterally, disc of 2 rather densely covered with suberect, pale hairs which do not hide surface, 3 and 4 with shorter, more obscure, suberect pubescence which is dark at least in part; punctures of terga close medially, fine on 2 and somewhat coarser on 3 and 4, discs of 2 and 3 with dull sublateral, impunctate areas on each side; tergum 5 densely pale tomentose across base, with sub-erect, somewhat darker hairs apically, apical margin deeply depressed laterally but not in center, punctures rather irregular but quite coarse and close, apical margin not fasciate; tergum 6 very densely pale tomentose, largely hiding surface, carina very low and irregularly crenulate, median emargination very obscure, apical margin without distinct median teeth, and lateral angles very obscure; tergum 7 transverse, flattened, not at all produced medially; sterna 1-4 exposed, finely and rather closely punctate, punctures becoming very fine apically on 4, 2 and 3 quite deeply depressed apically, yellowish-hyaline, with quite dense fringes of rather elongate, white hairs; sternum 5 quite broadly incurved apically, median area occupied by the very short, transverse setose area, the setae very fine and dense; setose areas of sternum 6 slightly separated medially, setae very fine and quite dense, apical lobe broad and very short, deeply incurved medially, resulting in a pair of sublateral, more or less acute lobes; gonocoxites of genital armature strongly narrowed above base, strongly and rather obliquely compressed, down-curved apically, but tip elongate, very narrow, at right angles to the sub-apical part, inner surface of apical half very conspicuously long setose.

DISTRIBUTION—This is another Old World species, and was introduced into the United States apparently some time during or just after World War II. It now ranges from Virginia to Massachusetts, west to California, and is in flight during June, July and August.

FLOWER RECORDS—*Asclepias, Melilotus, Polygonum, Solidago* and *Veronica.*

There is a degree of uncertainty regarding the identity of this species. A female specimen in the Copenhagen Museum that is indicated as the type is in close agreement with *centuncularis* Linnaeus, and bears little resemblance to the species which has been accepted by European taxonomists as *rotundata.* There is a possibility that this concept of *rotundata* is based on another type specimen. Moreover, the original brief description seems to suggest this species rather than *centuncularis.*

Megachile (Megachile) centuncularis (Linnaeus)

(Figs. 41 & 42)

Apis centuncularis Linnaeus, 1758. Syst. Nat. 10, p. 575.
Megachile infragilis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♂.
Megachile leoni Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 150. ♀.
Anthemois centuncularis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Anthemois) centuncularis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 158.
Megachile (Megachile) centuncularis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1057. (larva)
Megachile centuncularis Medler, 1959. Canad. Ent. 91, pp. 113-115. (biology)

FEMALE—Length 10-11 mm.; entirely black, including tegulae and legs, spurs yellow; eyes very slightly convergent below; clypeus rather strongly convex, apical margin straight, narrowly shining and impunctate medially; mandibles distinctly 5-dentate; lateral ocelli slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width; punctures rather coarse, but shallow, well separated on vertex laterally, somewhat closer medially, and closely crowded below ocelli, becoming fine, close and obscure on cheeks; punctures rather coarse and well separated on clypeus and supraclypeal area medially, becoming close laterally and along upper margin of clypeus; pubescence quite copious, largely yellowish on head and thorax, but with some darker hairs

in region of ocelli and on vertex laterally; pubescence long and copious around antennae and on sides of face below, on clypeus and over most of thorax laterally and posteriorly, dorsum of thorax somewhat more thinly pubescent; punctures of scutum coarse, close and distinct, not very deep, slightly separated only in center of disc, scutellum and axillae with densely crowded punctures; punctures of pleura rather shallow, quite close and coarse, surface rather dull, propodeum somewhat more shining, punctures minute and rather close and obscure; mid and hind basitarsi nearly as broad as their tibiae, but considerably shorter; tegulae shining, with very fine and rather close punctures; wings subhyaline, faintly clouded apically, veins testaceous-piceous; abdominal terga 2-4 with complete, transverse grooves which are submedian near center, somewhat nearer basal margin at extreme sides, punctures fine, rather well separated medially, becoming somewhat closer laterally, those on apical portions of discs somewhat closer than those on basal side of grooves, apical margins not at all depressed medially, somewhat depressed toward extreme sides where there are quite densely yellowish fasciate; tergum 5 not grooved, punctures slightly separated, rather fine and irregular, apical margins slightly depressed, with a complete yellowish fascia; discal pubescence suberect, rather dense, entirely yellow on terga 1 and 2, short, black and erect on 3-5, but with yellowish hairs evident at sides as viewed from above, 6 very slightly concave in profile, with abundant, erect and rather elongate, black hairs evident, surface very finely, closely and deeply punctate across base, these becoming very fine, densely crowded and obscure toward the apex; sternum 6 largely bare and shining, with a subapical fringe of elongate hairs, and a more nearly apical fringe of shorter hairs, apex produced slightly beyond this fringe, yellowish-hyaline; scopa orange-yellow, sternal plates closely, quite uniformly punctate, punctures very fine on the more basal segments, becoming quite coarse and close on the more apical sterna, no sternal fasciae evident.

MALE—Length 8-9 mm.; black including legs, tegulae somewhat more brownish-testaceous, spurs yellow; clypeal margin nearly straight, very slightly and narrowly produced medially, mandibles distinctly 3-dentate, with a triangular, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks about as broad as eyes; punctures deep and distinct, slightly separated on vertex toward each side, rather finely crowded on face medially and below ocelli; cheeks very finely and quite closely punctate, pubescence yellowish, quite dense and elongate around antennae and over face below, rather short but faintly yellowish and quite copious on cheeks below, minutely and densely crowded over lower part of face and clypeus; scutum closely, rather coarsely and distinctly punctate throughout, punctures densely crowded laterally and over scutellum and axillae, very close on pleura; propodeum somewhat shining, smooth, punctures minute and quite close posteriorly; all basitarsi slender and simple, much shorter than their tibiae; middle spurs well developed; tegulae shining, minutely and rather closely punctate; wings subhyaline, veins piceous; basal transverse grooves evident on terga 2 and 3, these together with 1 and 4, quite closely and regularly punctate, apical margins slightly depressed laterally, discal pubescence erect and pale on terga 1 and 2, dark in part on 3-5, base of 5 with a rather large patch of appressed, yellowish tomentum, apical margin depressed, densely yellowish fasciate; tergum 6 shining, with minute and very close punctures and scattered, more or less distinct, well separated nodules, the carina only slightly produced, very shallowly emarginate apically, median teeth of apical margin carinate and broad, lateral teeth very low and subacute; sterna 1-4 exposed, yellowish-hyaline apically, with rather dense fringes of pale yellowish hair, punctures close and rather fine on the more basal terga, becoming somewhat coarser but still close apically; setose area of sternum 5 much restricted, densely setose (fig. 41); setose areas of sternum 6 nearly meeting, apical lobe very small and narrow, barely evident; gonocoxites robust, flexed ventrally, reflexed at tip (fig. 42).

DISTRIBUTION—This is a holarctic species, its range extending from the Pacific to the Atlantic in Canada and the northern half of the United States. In the east it has been recorded from Nova Scotia to Minnesota, Iowa, Illinois and Virginia, and is in flight from May to September.

FLOWER RECORDS—*Melilotus* and *Trifolium*. Medler (1959) records it visiting *Epilobium angustifolium* and *Solidago* sp., and states that it is an effective pollinator of alfalfa (*Medicago sativa*). In the Revision of *Megachile* (Mitchell, 1935) the following additional, genera are listed: *Althaea, Psoralea, Centaurea, Carduus, Grindelia, Helianthus, Inula, Taraxacum* and *Vernonia*. Robertson (1929) lists a number of genera, not previously cited. However, he believed *centuncularis* and *relativa* to be synonymous, making his records uncertain.

In the revision (Mitchell, 1935) this species is recorded from Enterprise and St. Augustine, Florida. In view of the general picture the distribution of this species presents, these records seem highly improbable.

Megachile (Megachile) inermis Provancher

(Figs. 40-42)

Megachile simplex Provancher, 1882. Nat. Canad. 13, p. 229. ♂. Preocc.
Megachile inermis Provancher, 1888. Addit. Corr. Faune Ent. Canad. Hym., p. 323. ♂.
Megachile simplicissima Dalla Torre, 1896. Cat. Hym. 10, p. 449. (new name)
Megachile sapellonis Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 7. ♀.
Megachile temporalis Friese, 1903. Ztschr. System. Hym. Dipt. 3, p. 247. ♂.
Cyphopyga inermis Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 150.
Megachile decipiens Lovell and Cockerell, 1907. Psyche 14, p. 19. ♂.
Megachile (Anthemois) inermis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 171.
Megachile inermis Stephen, 1956. Pan-Pacific Ent. 32, pp. 95-101. (biology)
Megachile inermis Koerber and Medler, 1958. Wisc. Acad. Sci., Arts & Letter 47, p. 56. (biology)
Megachile inermis Medler, 1958. Canad. Ent. 90, pp. 325-327. (biology)

FEMALE—Length 15-20 mm.; entirely black, including tegulae and legs; eyes parallel; clypeal margin about straight, with a slight but rather broad, median protuberance and a narrow but rather deep emargination on each side, margin at extreme sides with an oblique, subapical groove beyond which the surface is shining and impunctate; mandibles conspicuously 5-dentate, a bevelled cutting edge between the 2nd and 3rd teeth (fig. 40); lateral ocelli considerably nearer eyes than to margin of the very broad vertex; width of cheeks about twice that of eyes; vertex shining, punctures rather deep and distinct, variable in size, rather close medially, becoming more sparse laterally, especially between ocelli and eyes, punctures on cheeks minute, slightly separated and quite evenly distributed; face below ocelli rather coarsely rugoso-punctate, supraclypeal area and clypeus more or less shining and sparsely punctate medially, punctures becoming rather close and quite deep on lateral margins; pubescence whitish, rather dense around antennae and at sides of face, elongate and pale on cheeks below, but rather thin, becoming shorter and thinner above, whitish and dense on thorax laterally and posteriorly, with erect and elongate black hairs on vertex, between ocelli, and to some degree between antennae; scutum and scutellum with erect and conspicuous, blackish pubescence, becoming pale peripherally; scutum somewhat shining, punctures quite deep and distinct, slightly separated medially, becoming densely crowded laterally and anteriorly; scutellum rather dull, punctures closely crowded and rather fine, very fine and dense on axillae; pleura somewhat shining below between fine and close but slightly separated punctures, these becoming very fine and quite densely crowded above; propodeum somewhat more shining and smooth; mid and hind basitarsi somewhat shorter and narrower than their tibiae; tegulae somewhat shining, smooth and impunctate in large part, but with some very minute, rather close punctures anteriorly and on inner sides; wings subhyaline, veins brownish-testaceous; terga 2-5 with complete but rather shallow sub-basal grooves, basal margins quite distinct but not definitely carinate, apical margins of terga narrowly depressed, whitish fasciate, the fasciae more or less interrupted on the more basal terga, pubescence of basal tergum elongate and rather copious, entirely whitish, discs of following terga with short but erect, rather conspicuous hairs, these blackish on each disc apically, to some degree pale toward base, punctures very fine or minute, slightly separated, rather obscure, becoming slightly coarser and closer at extreme sides; tergum 6 nearly straight in profile, with short and rather inconspicuous, suberect hairs evident, these largely black, surface rather densely covered with very fine appressed dark tomentum which does not hide surface, this very densely and finely punctate; sternum 6 well covered with pale scopal hairs, with a dense, apical fringe of very short hairs; scopa otherwise pale yellowish, the sterna closely and deeply punctate, finely so on the more basal segments, becoming rather coarse apically, apical margins narrowly yellowish-hyaline, not at all fasciate.

MALE—Length 11-15 mm.; entirely black, including tegulae and legs, spurs testaceous; eyes subparallel; clypeal margin nearly straight, with a very slight, median protuberance, densely covered with an elongate, pale fringe; mandible with an elongate, basal, rather broadly carinate, inferior process, apical margin with a small, median tooth which is approximate to the apical tooth (fig. 40); apical segment of flagellum narrow and elongate; lateral ocelli much nearer eyes than to margin of the very broad vertex; width of cheeks about twice that of eyes; punctures of vertex rather fine and shallow, quite close medially, becoming rather well separated and irregular between eyes and ocelli, close and

fine on cheeks, face below ocelli more closely rugoso-punctate, punctures becoming very fine and densely crowded below antennae and on clypeus; pubescence quite copious, dense and elongate around antennae and over lower part of face, on cheeks below, on thorax laterally and posteriorly, becoming somewhat thinner but still quite elongate on vertex and dorsum of thorax, with a few dark hairs intermixed with generally pale pubescence on vertex and scutum; punctures rather fine and close over most of scutum, being slightly separated only in center, densely crowded elsewhere; somewhat finer and crowded over most of clypeus, being slightly separated only in midline, very fine and densely crowded on axillae; pleura rather smooth, punctures very fine and quite close; propodeum somewhat smoother but rather dull, surface largely obscured by pubescence; coxal spines represented by low dentiform tubercles; all basitarsi much shorter and narrower than their tibiae, the apical tarsal segments becoming more or less reddish; mid tibial spurs short but well developed; tegulae shining, with scattered irregular minute punctures; wings subhyaline, veins brownish-testaceous; terga 2-4 rather deeply grooved basally, grooves complete, their basal margins somewhat carinate, apical margins of terga rather abruptly depressed, especially toward sides, rather densely white fasciate, but fasciae rather widely interrupted medially on the more basal terga, 1 and 2 with rather elongate, entirely pale, erect pubescence, discal pubescence of 3 and 4 suberect, largely black, 3-5 more or less densely fasciate across base, and 5 with a complete, apical fascia; punctures of terga very minute and well separated throughout, 6 somewhat shining, surface very minutely and rather closely, shallowly punctate, deeply depressed just before the carina medially, the carina rather broadly and shallowly emarginate medially, entire laterally, median teeth of apical margin inevident, lateral teeth small but distinct and acute; tergum 7 clearly evident, transverse, rather short, the broad, dorsal area rather broadly excavated and shining, apical margin blunt; setose area of sternum 5 very extensive, setae rather robust (fig. 41); sternum 6 with an extensive setose area on each side of mid-line, the setae robust, spine-like, apical lobe inconspicuous, transverse and very short; gonocoxites robust, with small, basal, carinate protuberances, constricted medially, apical half broadly dilated, long setose on inner face (fig. 42).

DISTRIBUTION—British Columbia to Nova Scotia, south to New Mexico, Texas and Georgia, June to September.

FLOWER RECORDS—*Baptisia, Carduus, Inula, Lathyrus, Nepeta, Pentstemon, Polymnia, Rhododendron, Rubus, Sanicula, Taraxacum, Tephrosia* and *Vernonia.*

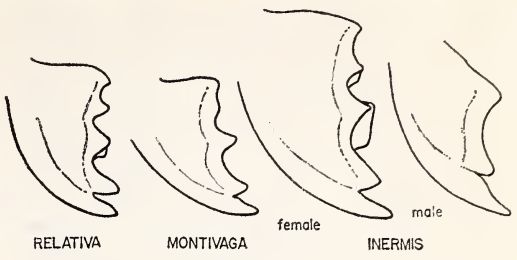


Figure 40
Mandibles in species of *Megachile (Megachile).*

Megachile (Megachile) montivaga Cresson

(Figs. 40-42)

Megachile montivaga Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 124. ♀ ♂.

Cyphopyga montivaga Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile montivaga Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 219. (biology)

Megachile (Anthemois) montivaga Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 167.

FEMALE—Length 11-13 mm.; entirely black, including tegulae and legs, spurs testaceous; eyes very slightly convergent below; clypeus slightly convex, apical margin nearly straight, mandibles 4-dentate, but margin between 3rd and 4th teeth slightly angulate (fig. 40); lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures of vertex quite deep and distinct, close, not very coarse, becoming somewhat more shallow and close on cheeks, finer and more densely crowded below ocelli and along inner margins of eyes, but supraclypeal area and clypeus with shining spaces medially, punctures becoming quite deep, distinct and close laterally; pubescence of head and thorax entirely pale, rather copious but short around antennae, on inner orbits, cheeks below, and thorax laterally and posteriorly; vertex, scutum and scutellum with very short, sparse and inconspicuous pubescence, but apparently entirely pale; punctures of scutum quite close, deep, distinct, not very coarse, slightly separated in center of disc; punctures of scutellum finer than on scutum, slightly separated medially, becoming crowded laterally, very fine and densely crowded on axillae; punctures of pleura distinctly but

not widely separated below, rather deep and distinct, becoming somewhat finer and very close above; propodeum relatively smooth and somewhat shining; basitarsi of all legs somewhat narrower and shorter than their tibiae; tegulae very finely and rather closely punctate, becoming impunctate along outer margins; wings lightly infuscated, veins piceous; abdominal terga 2-4 quite deeply grooved across base, basal margins of grooves somewhat carinate, tergum 5 with a similar, very shallow groove which is nearly obliterated medially; apical margins depressed only toward sides on terga 2 and 3, quite deeply depressed across entire width of 4 and 5, quite densely white fasciate, the fasciae more or less interrupted on the more basal terga; discs of terga somewhat shining, finely and rather sparsely punctate medially, becoming somewhat closer only at extreme sides, but punctures basad of grooves, somewhat closer and deeper, although finer; discal pubescence very short, fine and inconspicuous, entirely pale, but that on tergum 1 relatively elongate and thin; tergum 6 distinctly concave in profile, with no erect hairs visible, surface very finely and closely punctate, punctures becoming inevident apically, surface very finely white tomentose toward apex, with scattered, more or less erect, pale hairs in addition; sternum 6 with scattered scopal hairs toward base, but quite bare over apical half, with an apical fringe of very short, pale hairs; scopa otherwise pale yollow, sterna closely, deeply and finely punctate on the more basal segments, becoming somewhat more sparse and coarse apically, apical margins very narrowly yellowish-hyaline, but not fasciate.

MALE—Length 9-11 mm.; black, tegulae more or less testaceous, legs somewhat reddened, spurs yellow; eyes slightly convergent below; clypeal margin nearly straight; mandible, with a sharply acute, sub-basal, inferior process; apical segment of flagellum narrow and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly broader than eyes; punctures of vertex rather fine, deep and distinct, close medially, but somewhat more widely separated laterally, those on checks uniformly close and fine, somewhat coarser and slightly separated just below anterior ocellus, otherwise very fine and densely crowded over most of face, slightly separated only in center of clypeus and along its upper margin; pubescence entirely pale on head and thorax, white and quite dense around antennae and over lower half of face, on checks below, becoming rather short above, and dense and white on thorax laterally and posteriorly, becoming rather short and fine on on vertex and dorsum of thorax, with a few shorter, inconspicuous, darker hairs evident on vertex; scutum dull, punctures quite shallow, not very coarse, slightly separated medially, becoming closer anteriorly and posteriorly, uniformly close and fine on scutellum, and very fine and crowded on axillae; pleura dull, punctures fine and uniformly crowded; propodeum somewhat smoother, shining; basitarsi much shorter and narrower than their respective tibiae, mid tibial spurs rather short but well developed, front coxal spines represented by acute, dentiform tubercles; tegulae minutely and rather closely punctate; wings subhyaline, veins brownish-piceous; terga 2-4 with complete, transverse, basal grooves, basal margin of these rather distinctly carinate, apical margins of the terga rather deeply depressed laterally but not medially, depressed areas densely white fasciate; tergum 1 with rather long, erect, entirely whitish pubescence, that on 2 very short and inconspicuous but evident, discal pubescence on 3 and 4 largely lacking but 5 with sparse, erect and rather elongate, pale hairs; tergum 1 very closely and finely punctate, punctures becoming successively more distinct and somewhat more coarse on the more apical terga, well separated but not sparse on 5, 6 dull, punctures fine and densely crowded except across the narrow base, rather strongly protuberant medially, carina with a shallow, median emargination and slightly, irregularly crenulate on each side, median teeth of apical margin carinate, much nearer the acute, slender, lateral teeth than to each other; tergum 7 clearly evident, short, transverse, quite deeply concave just back of margin; sterna 1-4 exposed, punctures quite close and rather fine, apical margins of 2-4 abruptly and quite deeply depressed, clear hyaline, rather conspicuously fringed with elongate, whitish hairs; setose area of sternum 5 broad and extensive, setae elongate (fig. 41); sternum 6 with an extensive area of long, robust, recurved setae on each side of mid-line, apical lobe transverse, slightly produced medially; gonocoxites slender, conspicuously protuberant at base, constricted medially, rounded apically (fig. 42).

DISTRIBUTION—California to Nova Scotia, south to Mexico, Illinois and North Carolina; June to September.

FLOWER RECORDS—*Argemone, Campanula, Carduus, Centaurea, Cirsium, Coreopsis, Geranium, Gutierrezia, Helianthus, Lactuca, Medicago, Opuntia, Rosa, Verbena* and *Vernonia.* Robertson (1929) lists the following additional genera: *Asclepias, Blephilia, Brauneria, Dianthera, Monarda, Oenothera, Parthenium, Pentstemon, Rudbeckia, Scrophularia, Silphium,* and *Verbesina.*

Megachile (Megachile) nivalis Friese

Megachile nivalis Friese, 1903. Ztchr. System. Hym. Dipt. 3, p. 246. ♀. (♂ misdet.)
Megachile (Anthemois) santiamensis Mitchell, 1934. Amer. Ent. Soc. Trans. 59, p. 311. ♀.
Megachile (Anthemois) nivalis Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 174.
Megachile (Anthemois) nivalis Mitchell, 1942. Pan-Pacific Ent. 18, p. 115. ♂ ♀.

Although the female of this species is easy to recognize, it is very similar to *relativa* and in most characters is hardly distinguishable from that species. Tergum 6 in the female is straight in profile, with no erect hairs visible, although in the dorsal view a few black erect hairs may be seen toward the sides at base. Also this plate is entirely black pubescent, with no yellowish or golden tomentum at all evident. The scopal hairs on sterna 5 and 6 are entirely black, with the remainder of the scopa yellow as in *relativa*. In all other essential characters, allowing for individual variations, it agrees with *relativa*. The male, also, appears to agree with *relativa* and in fact cannot be separated from it. A few males have been collected under circumstances which would suggest their relationship to female *nivalis*. These have been studied and compared quite fully with *relativa* males, in the hope of finding some constant and reliable difference, but without success. It is possible of course that the true male has not yet been discovered.

DISTRIBUTION—Alaska to Idaho, Colorado, Minnesota, Quebec and Maine, June to August.

FLOWER RECORDS—*Eleagnus* and *Taraxacum*.

Megachile (Megachile) relativa Cresson

(Figs. 40-42)

Megachile relativa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 126. ♀.
Megachile (Xanthosarus) exclamans Viereck, 1916. Conn. State Geol. and Nat. Hist. Surv. Bul. 22, p. 743. ♀.
Megachile aspera Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 158. ♀.
Megachile (Anthemois) relativa Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 162.
Megachile relativa Medler and Koerber, 1958. Ent. Soc. Amer. Ann. 51, pp. 337-344. (biology)
Megachile relativa Koerber and Medler, 1958. Wisc. Acad. Sci., Arts & Letters 47, p. 56. (biology)

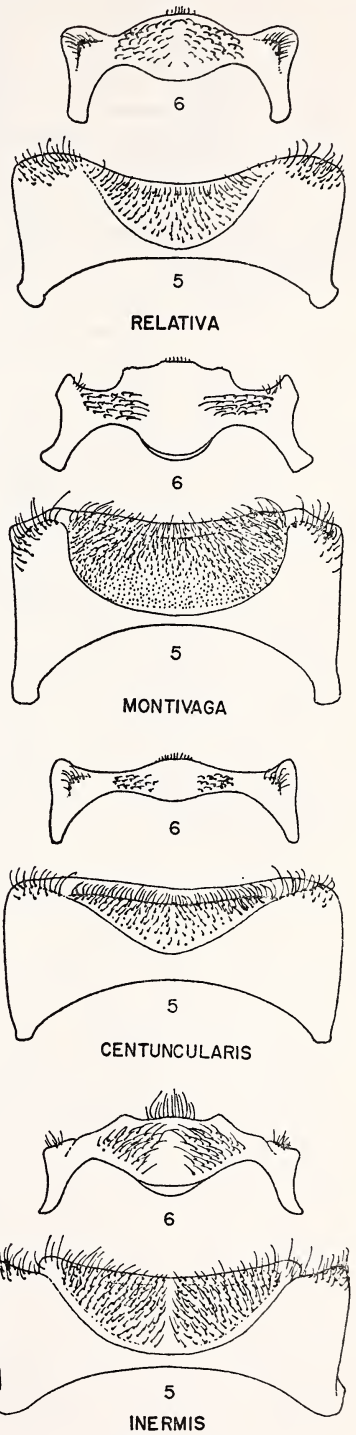


Figure 41
Sterna 5 and 6 in males of *Megachile (Megachile).*

FEMALE—Length 9-12 mm.; entirely black, including tegulae and legs, spurs yellow; eyes very slightly convergent below; clypeal margin nearly straight, obscurely crenulate; mandibles 5-dentate (fig. 40); lateral ocelli much nearer margin of vertex than to eyes; cheeks very slightly broader than eyes; punctures on vertex rather fine and shallow, to some degree separated, but rather irregular, becoming slightly more coarse and close on cheeks, face below ocelli more rugose, supraclypeal area rugose laterally but with a shining space medially, clypeus with rather shallow but quite close punctures; pubescence whitish, more or less erect and copious around antennae, lower half of face, and on cheeks; whitish and rather copious on thorax laterally and posteriorly, the vertex, scutum and scutellum with erect but rather thin and sparse, black pubescence; scutum shining medially where the punctures are well separated, quite shallow and rather coarse, becoming densely crowded laterally and anteriorly, those on scutellum and axillae somewhat finer and very close except in mid-line of scutellum; pleura somewhat shining below, punctures shallow and rather coarse, slightly separated, becoming closely crowded above where the surface is dull; propodeum smooth and somewhat shining; mid and hind basitarsi slightly shorter and narrower than tibiae; tegulae very finely and obscurely punctate anteriorly, otherwise smooth and impunctate; wings subhyaline, veins piceous; terga 2-4 with shallow, sub-basal grooves, their basal margins faintly carinate, apical margins of terga depressed laterally but not medially, these lateral areas quite densely whitish fasciate, discal pubescence erect and blackish, more copious, elongate and entirely white on basal tergum; punctures of basal tergum fine, well separated but not sparse, somewhat coarser on the more apical terga, apical margin of 5 depressed and whitish fasciate across entire width, 6 straight in profile, with a few, robust, erect, but rather short hairs evident, surface rather densely covered with yellowish, appressed tomentum; sternum 6 sparsely covered with scopal hairs and with an apical fringe of very short yellow hairs; scopa otherwise yellow, the sterna closely, deeply and rather finely punctate basally, punctures becoming somewhat more sparse on the more apical plates, apical margin of each sternum very narrowly yellowish-hyaline, not fasciate.

MALE—Length 8-10 mm.; entirely black, tegulae becoming testaceous along margins, legs somewhat reddened; eyes slightly convergent below; clypeal margin nearly straight, with a distinct and rather robust median tubercle; mandible 3-dentate, with a rather narrow, sub-basal, inferior process which is subtruncate apically; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks somewhat broader than eyes; punctures rather fine, slightly separated across vertex posteriorly, rather sparse between ocelli and eyes, becoming more regularly close on cheeks above, densely crowded or rugose below; face below ocelli rather coarsely rugosopunctate, becoming finely so below antennae and over clypeus; pubescence whitish, quite long and copious around antennae and lower part of face, on cheeks below and on thorax laterally and posteriorly; vertex, scutum and scutellum with more or less intermixed light and dark hairs which are quite long and erect but rather thin; scutum rather dull, punctures close, rather shallow, not very coarse, slightly separated only in center of disc; punctures of scutellum slightly separated along mid-line, but otherwise quite uniformly close, those on axillae much finer and densely crowded; pleura rather dull, punctures shallow, quite close and rather vague; propodeum relatively smooth and shining; basitarsi quite short and slender, the more apical tarsal segments to some degree yellowish; mid tibial spurs short but well developed; tegulae shining, rather uniformly, minutely and rather closely punctate; wings subhyaline, veins piceous; terga 2-4 shallowly grooved or depressed across base, basal margin of grooves not distinctly carinate, apical margins of terga depressed only toward sides, depressed medially only on 4 and 5, pale apical fasciae evident at extreme sides of the more basal terga, more or less complete on 4 and 5, discal pubescence rather thin and short, largely pale, but with dark hairs evident toward sides on all except basal tergum which is covered with quite copious, elongate, whitish pubescence; punctures very fine, surface shining, rather close on tergum 2 barely evident on 1, quite sparse on 3 and 4, becoming somewhat coarser laterally, but still well separated, 5 with somewhat closer and coarser punctures throughout; tergum 6 shining, carina very low, broadly and shallowly incurved medially, punctures fine and close above carina, becoming somewhat more coarse and sparse laterally, median teeth of apical margin broadly carinate, widely separated, relatively near the short, acute, lateral teeth; tergum 7 quite prominant, broad and short, with a deep excavation on dorsal surface; sterna 1-4 exposed, closely but rather vaguely punctate, apical margins of 2-4 broadly yellowish-hyaline and with thin, apical fringes of pale hairs; setose area of sternum 5 restricted, finely setose (fig. 41); sternum 6 sparsely setose on each side, apical lobe inevident; gonocoxites slender, protuberant basally, apex acute (fig. 42).

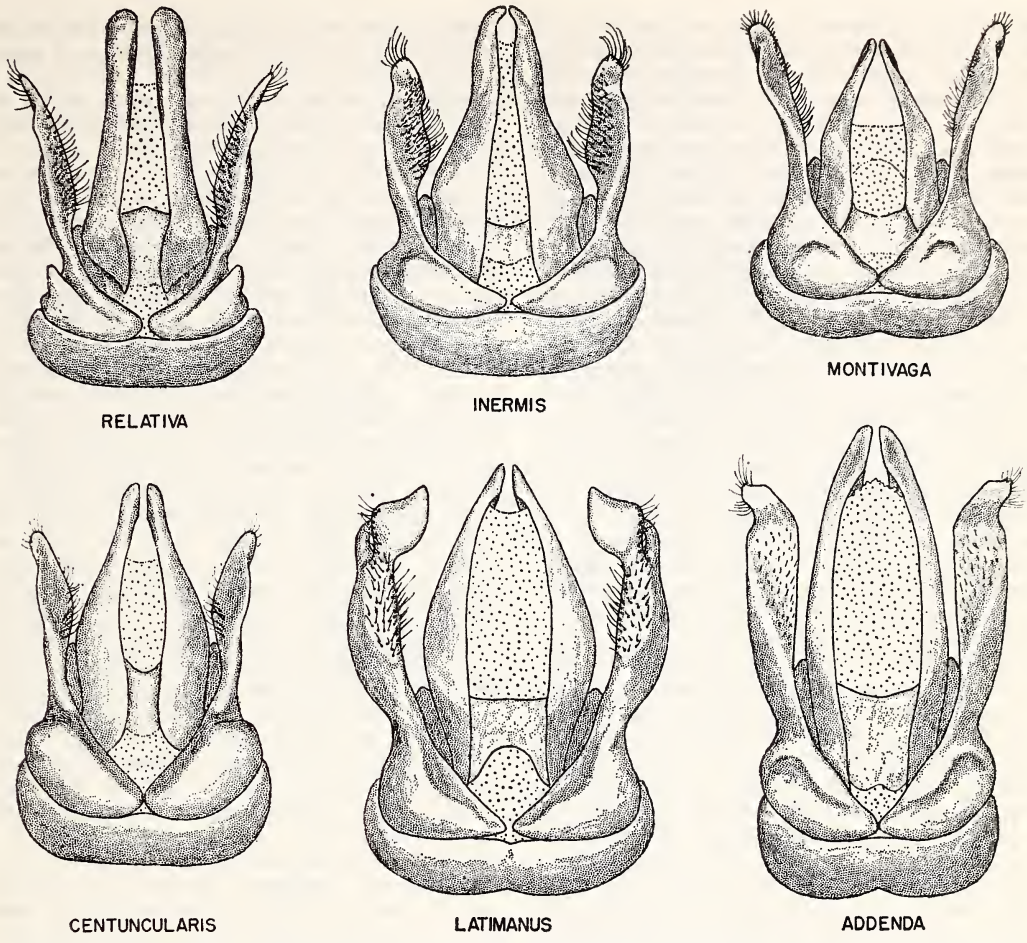


Figure 42—Genital armatures in males of *Megachile (Megachile)* and in *M. latimanus* and *M. addenda*.

DISTRIBUTION—Mackenzie to Newfoundland, south to California, Illinois, Tennessee and Georgia, May to October in the more southern parts of its range.

FLOWER RECORDS—*Aster, Baptisia, Brassica, Chrysanthemum, Epilobium, Geranium, Houstonia, Melilotus, Physallis, Ranunculus, Rhodora, Rosa, Rubus, Rudbeckia, Solidago, Trifolium* and *Zizia*.

Megachile (Delomegachile) addenda Cresson

(Figs. 42-45)

Megachile addenda Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 124. ♀ ♂.

Megachile manumuskin Viereck, 1902. Canad. Ent. 34, p. 328. ♀ ♂.

Megachile addenda Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Delomegachile) addenda Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 178.

FEMALE—Length 11-14 mm.; entirely black, including tegulae and legs, spurs more testaceous; eyes subparallel; clypeal margin very slightly incurved and finely crenulate; mandibles 4-dendate, a bevelled edge between 3rd and 4th teeth, 4th narrowly rounded or acute (fig. 43); lateral ocelli slightly nearer eyes than to margin of vertex; cheeks very slightly broader than eyes; vertex shining, punctures fine, slightly separated across posterior margin, becoming more minute laterad of ocelli, considerably closer and finer on cheeks; face below ocelli rather finely rugosopunctate, punctures somewhat separated on supraclypeal area medially and on mid-line of clypeus, becoming quite close and fine laterally; pubescence white, rather dense and elongate around antennae and over lower half of face, on cheeks below, and on thorax laterally and posteriorly, becoming thin but still

white on cheeks above, vertex and scutum with considerable rather short, erect, black pubescence, this somewhat more elongate on scutellum; scutum shining, punctures fine, well separated in center but close to almost crowded elsewhere, those on scutellum somewhat more sparse, very fine and close on axillae; pleura quite densely punctate beneath copious pubescence; propodeum smoother, somewhat shining, only vaguely and minutely punctate; front and mid basitarsi quite broad, slightly narrower but very much shorter than tibiae, hind basitarsi nearly equalling their tibiae in length and breadth; tegulae shining, with scattered, very minute and slightly separated punctures; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-piceous; abdominal terga 2-5 with transverse, quite deep, complete grooves, these occupying nearly half of each disc, basal margins sharply and conspicuously carinate, apical margins of terga quite abruptly but narrowly depressed, occupied by dense, entire, white, apical fasciae; basal tergum with more erect, loose pubescence which is white laterally, more or less fuscous medially, discal pubescence of following terga short but copious, entirely black; punctures on the more basal terga very fine and quite close, becoming slightly more distinct and separated but still close on the more apical terga; tergum 6 distinctly concave in profile, with abundant, erect, blackish pubescence evident over most of disc, but the more apical hairs becoming densely appressed; sternum 6 well covered with black, scopal hairs, with a somewhat bare, shining, median, apical area, a short dense fringe apically; scopa otherwise yellowish-white, the sterna very closely and finely punctate on basal segments, becoming somewhat more coarse and sparse apically, apical margins of the sterna narrowly yellowish-hyaline, entirely lacking fasciae.

MALE—Length 10-13 mm.; entirely black, including tegulae and legs, spurs more brownish-testaceous; eyes subparallel; clypeal margin straight, slightly crenulate; mandible 4-dentate, with a narrow, elongate, subacute, basal, inferior process, 3rd tooth very low and inconspicuous (fig. 43); apical segment of flagellum slender and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slighty broader than eyes; punctures of vertex, fine but distinct, rather close medially, becoming more widely separated laterally, very close and fine on cheeks, becoming crowded below; face below ocelli with densely crowded punctures, those on supraclypeal area and sides of face minute and densely crowded beneath dense pubesence, considerably coarser but very close on clypeus dorsally, becoming minute and densely crowded apically; pubescence quite copious and elongate, yellowish-white on face and clypeus, white and quite dense on cheeks and on thorax laterally and posteriorly, vertex with some erect, more or less fuscous pubescence interspersed with pale long hairs, and scutum pale pubescent anteriorly, but with a patch of fuscous hairs across posterior half, scutellum with a few fuscous hairs interspersed among the pale; scutum rather closely but distinctly punctate, punctures slightly separated medially, becoming close laterally and posteriorly, scutellum somewhat more finely but quite closely punctate, those on axillae very fine and crowded; pleura dull, with densely crowded punctures beneath copious pubescence; propodeum smooth and somewhat shining, with only very minute and obscure punctures; front coxal spines well developed, rather short, quite slender, acute at tip, coxa with an obscure patch of short, decumbant, brownish hairs at base of each spine; middle spurs short but well developed; all basitarsi short, simple and narrow, front and mid tarsi rather prominantly white fringed posteriorly; tegulae shining, minutely and quite closely punctate; wings subhyaline, veins brownish-testaceous; terga 2-5 with complete, basal, transverse grooves, basal margin of each conspicuously carinate, apical margins of terga deeply depressed, conspicuously and densely white fasciate, pubescence of basal tergum and grooves of 2-4 whitish, the more apical discal pubescence of 2-5 erect and black; punctures of all terga minute, rather well separated but not sparse, becoming quite close toward depressed margins of all; tergum 6 somewhat shining, largely bare, with only very fine, erect hairs, very finely and closely punctate, carina consisting of a pair of rounded, irregularly crenulate lobes delimiting a broad, rounded emargination, median teeth of apical margin hardly evident, lateral teeth small and acute but distinct; tergum 7 acutely pointed medially; sterna 1-4 exposed, surface shining, very minutely and rather closely punctate, apical margins narrowly yellowish-hyaline, rather densely fringed with long, white hairs; setose area of sternum 5 quite extensive, finely setose (fig. 44); sternum 6 with indefinite, lateral, sparsely setose areas that are slightly separated, apical lobe short and broad, acutely angulate laterally; gonocoxites narrowed above base, flattened apically, apex narrowly produced and recurved (fig. 45).

DISTRIBUTION—Ontario, Quebec and the New England states, south to Florida, west to California, April to July.

FLOWER RECORDS—*Amorpha, Baptisia, Hieraceum, Hypericum, Oenothera, Opuntia, Pentstemon, Polycodium, Psoralea, Rubus, Tephrosia* and *Vaccinium.* Robert-

son (1929) records *addenda* on *Asclepias, Coreopsis, Dianthera, Gillenia* and *Rosa.*

Megachile (Delomegachile) frigida frigida Smith

(Figs. 43-45)

Megachile frigida Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 193. ♂.
Megachile monardarum Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 11. ♀.
Megachile frigida Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 338.
Megachile vidua Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.
Megachile (Delomegachile) vidua Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 200.
Megachile (Delomegachile) frigida Mitchell, 1944. Pan-Pacific Ent. 20, p. 135.
Megachile frigida Stephen, 1956. Pan-Pacific Ent. 32, pp. 95-101. (biology)

FEMALE — Length 12-15 mm.; entirely black, including tegulae and legs, spurs testaceous; eyes subparallel; clypeal margin very shallowly incurved, the narrow median area very slightly produced, narrowly shining and impunctate; mandibles 4-dentate, inner tooth broadly truncate (fig. 43); lateral ocelli subequally distant from eyes and margin of vertex; cheeks considerably wider than eyes; punctures of vertex relatively coarse and distinct, quite close medially, becoming well separated laterally between eyes and ocelli, cheeks minutely and quite closely punctate throughout; face below ocelli rather densely rugoso-punctate, becoming very finely so on sides of face, supraclypeal area more or less shining medially, punctures minute and vague, becoming close and rather deep laterally, clypeus with a median, impunctate line, punctures quite close and deep on each side; pubescence yellowish-white and rather copious around antennae and over lower half of face, on cheeks below, and on thorax laterally and posteriorly, vertex with more or less fuscous, erect pubescence, a quite dense line of erect fuscous hairs above anterior ocellus and below lateral ocelli; scutum and scutellum with extensive areas of erect, fuscous hairs, scutum rather narrowly pale pubescent anteriorly; punctures of scutum and scutellum quite deep and distinct, close in large part, slightly separated only in center of scutum, close throughout on scutellum and fine and densely crowded on axillae; pleura rather dull, punctures very close, rather coarse below, becoming fine and densely crowded above; propodeum somewhat smoother and more shining, with only very vague and minute punctures evident; hind basitarsi somewhat narrower and shorter than their tibiae, fore and mid basitarsi much shorter than their tibiae; tegulae shining, with close, minute punctures; wings subhyaline, veins brownish-testaceous; terga 2-4 shallowly grooved across base, basal margin of grooves only very slightly carinate, tergum 5 with only a subcarinate basal impression, apical margins of terga rather narrowly and slightly depressed laterally, these whitish fasciate laterally, completely so on 4 and 5, discal pubescence of 1 and 2 copious, erect and entirely pale, 3-5 with conspicuous, erect and rather elongate blackish pubescence; punctures of terga minute, slightly separated medially, becoming slightly coarser laterally on the more apical plates; tergum 6 about straight in profile, with abundant, rather short, erect, black pubescence and with rather dense, subappressed, fuscous hairs; sternum 6 rather well covered with yellowish hairs, these becoming somewhat more sparse toward apex which is densely fringed with short dark hairs; scopa otherwise golden yellow, the more basal sterna, very closely and finely punctate, becoming somewhat more coarse and sparse toward apex, apical margins of each plate rather narrowly yellowish-hyaline, fasciae not evident.

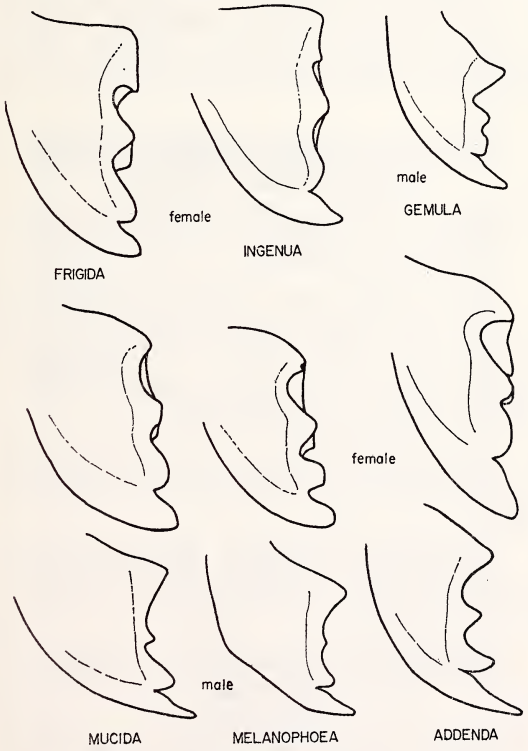


Figure 43
Mandibles in species of *Megachile (Delomegachile).*

MALE — Length 11-15 mm.; black, tegulae

more testaceous, spurs yellow and front legs in large part yellow; clypeal margin beneath beard nearly straight, slightly crenulate medially; mandibles distinctly 4-dentate, upper margin quite strongly flexed, lower margin somewhat angulate medially, margin straight from this to tip of basal, acute, inferior process; apical segment of flagellum quite broadly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks very much broader than eyes, inferior margin with an acute, robust tubercle just beneath base of mandible, and a pair of slightly oblique lines of dense, pale pubescence just above; punctures of vertex very fine and densely crowded medially, becoming slightly more coarse and distinct laterally, minute and densely crowded on cheeks, somewhat more coarsely rugosopunctate below ocelli, but very fine and densely crowded beneath pubescence on clypeus, supraclypeal area and sides of face; pubescence copious, yellowish and very dense around antennae and lower half of face, supraclypeal hairs directed upward, clypeal hairs outward and downward; cheeks with very short and rather sparse pale hairs, these becoming more erect and elongate on vertex; thorax with yellowish-white hairs laterally and posteriorly, dorsum with somewhat more copious, elongate, pale yellowish hairs, with no evident dark admixture; punctures of scutum, scutellum, axillae and pleura very fine and densely crowded, propodeum somewhat smoother, with only close, minute and vague punctures evident; front coxal spines narrow and much elongated, pubescent posteriorly only at base, coxa with a dense, patch of ferruginous setae at base of the spine, and dense, creamy pubescence laterally, the surface yellow; front tarsi broadly dilated and deeply excavated, entirely yellow, conspicuously broader than tibiae, with a broad, yellowish, posterior fringe; tibiae rather narrowly yellow at apex, otherwise fuscous on outer surface; posterior margin of femora fuscous, sharply carinate above, but otherwise largely pale yellow or testaceous, subcarinate below, lower surface toward base with a pair of conspicuous, longitudinal, brownish, integumental stripes, conspicuously fringed posteriorly toward base; mid and hind tarsi relatively short and narrow, but little modified, mid tarsi densely pale tomentose, hind tarsi with an elongate, prominant, anterior fringe; tegulae somewhat shining, very minutely and closely punctate; wing subhyaline, veins brownish-testaceous; terga 2-4 shallowly grooved across base, apical margins depressed laterally, with pale, apical fasciae at sides of 2 and 3, and a complete one on 4, 1 and 2 and base of 3 with copious, elongate, erect, pale yellowish pubescence, 4 and 5 and apex of 3 with largely fuscous pubescence; punctures fine and quite close but not crowded throughout; tergum 5 only inconspicuously fasciate apically, if at all; tergum 6 shining, very finely or minutely, closely punctate, carina rather low and not very broad, with a rather shallow, median, emargination, subentire on each side, median teeth of apical margin rather broadly carinate, somewhat nearer to each other than to lateral angles, lateral teeth not evident; tergum 7 acute medially, barely evident; sterna 1-4 exposed, surface shining, with exceedingly minute and hardly evident punctures, apical margins rather narrowly depressed and yellowish-hyaline, largely bare; setose area of sternum 5 short but quite broad, setae fine and short (fig. 44); sternum 6 with rather narrow, transverse, densely setose areas that nearly meet medially, apical lobe well developed, slightly produced medially, lateral angles narrowly produced and acute; gonocoxites gradually narrowed above base, slightly dilated and sinuate above, with a low, subapical, ventral protuberance, the apex narrowly produced (fig. 45).

DISTRIBUTION—Alaska to Newfoundland, south to Arizona, Michigan and Pennsylvania, June to August.

FLOWER RECORDS—*Apocynum, Astragalus, Campanula, Epilobium, Malvastrum, Medicago, Melilotus, Monarda, Pentstemon, Rosa, Trifolium, Verbena* and *Vicia.*

Megachile (Delomegachile) frigida appalachensis Mitchell

Megachile (Delomegachile) vidua var. *appalachensis* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 205. ♀ ♂.

This occurs in the southern Appalachians and differs from typical *frigida* in both sexes in the entire absence of the abdominal fasciae. It possibly averages slightly larger than the typical form.

DISTRIBUTION—New York, down the Appalachians to Georgia, June to September.

FLOWER RECORDS—*Apocynum, Baptisia, Coreopsis, Galax, Koellia, Pentstemon, Rhododendron,* and *Vernonia.*

Megachile (Delomegachile) gemula Cresson

(Figs. 43-45)

Megachile gemula Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 118. ♂. (♀ misdet.)

Megachile avara Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 123. ♂.

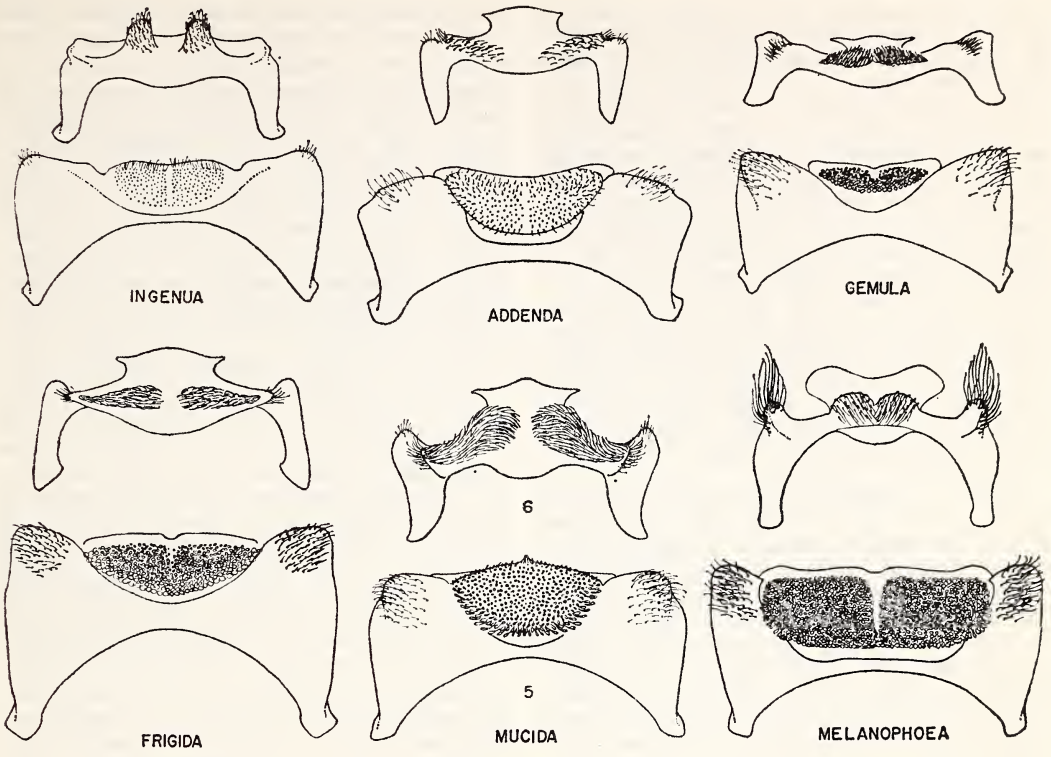


Figure 44—Sterna 5 and 6 in males of *Megachile (Delomegachile).*

Megachile Vancouveriensis Provancher, 1888. Addit. Corr. Faune Ent. Canad. Hym. p. 424. ♂.

Megachile vancouverensis Titus, 1906. Ent. Soc. Wash. Proc. 7, p. 151.

Megachile albula Lovell and Cockerell, 1907. Psyche 14, p. 18. ♂.

Megachile (Delomegachile) gemula Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 181.

FEMALE — Length 12-15 mm.; entirely black, including tegulae and legs, spurs more brownish-testaceous; eyes subparallel; clypeal margin nearly straight, with a short, median area narrowly shining and impunctate; mandibles 4-dentate, inner tooth very broadly truncate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly broader than eyes; vertex somewhat shining, punctures rather fine, quite close medially, becoming somewhat more widely separated laterally, minute and close on cheeks; face below ocelli with moderately coarse, contiguous punctures, becoming minutely and closely punctate laterally, supraclypeal area somewhat shining and sparsely punctate medially, becoming close at sides, somewhat separated in mid-line of clypeus, becoming quite densely crowded but rather coarse on each side; pubescence of head pale in part but intermixed with fuscous or blackish hairs over lower half of face and on cheeks medially and above, vertex with some very short, dark hairs and long, erect, pale hairs; thorax with rather dense and elongate pale pubescence laterally and posteriorly, scutum and scutellum covered quite densely with rather long, pale yellowish or whitish hairs, with varying amounts of fuscous hairs intermixed over posterior half of scutum; punctures of scutum quite deep and distinct, not very coarse, rather well separated medially but otherwise quite close or densely crowded, those on scutellum somewhat finer, sparse on midline but close laterally, very fine and close on axillae; pleura rather dull, with rather fine and densely crowded punctures; propodeum somewhat smoother but dull, punctures hardly evident; mid and hind basitarsi rather broad but distinctly shorter than tibiae, front tarsi rather short and slender; legs in large part short black pubescent, outer face of mid basitarsi with more brownish pubescence; tegulae somewhat shining, very minutely and closely punctate; wings sub-hyaline, becoming faintly infuscated apically, veins brownish-testaceous; abdominal terga 2-4 shallowly grooved across base, basal margins of the grooves quite distinct but hardly carinate, 4

with a basal impression but not a definite groove; apical margins shallowly depressed, but completely lacking fasciae; discal pubescence of terga 1 and 2 and base of 3 erect, entirely pale, but rather thin, that on 4-6 and apex of 3 erect, rather dense but short, entirely black; surface of terga shining, punctures minute, slightly separated in large part, becoming close toward extreme sides; tergum 6 about straight, with abundant, erect, blackish hairs evident in profile; sternum 6 rather well covered with dark scopal hairs, bare in part toward tip, with a dense fringe of short, fuscous hairs; scopa otherwise entirely black, basal sterna very closely and finely punctate, but punctures somewhat more widely separated on the more apical sterna, apical margins very narrowly yellowish-hyaline, sternal fasciae not evident.

MALE — Length 8-11 mm.; black, including tegulae and legs in large part; eyes very slightly convergent below; clypeal margin nearly straight, with a very small, median emargination; mandibles distinctly 4-dentate (fig. 43), with an acute, basal inferior process, which is very broadly triangular, with a broad base; apical segment of flagellum very slightly dilated; lateral ocelli very slightly nearer margin of vertex than to eyes; cheeks somewhat broader than eyes, somewhat excavated below lower end of eye, lower margin of this produced as a prominant, carinate tubercle; punctures of vertex quite deep and distinct, rather coarse, slightly but not widely separated, becoming closer on cheeks above, but more densely, irregularly rugose below, face below ocelli with relatively coarse, close punctures, these nearly contiguous, lateral areas of face and supraclypeal area becoming densely and very finely rugose, punctures of clypeus beneath pubescence rather coarse and quite close above, becoming very fine and densely crowded below; pubescence copious, elongate and yellowish-white on face and clypeus, somewhat more white and quite copious on cheeks below, thin above, and whitish on thorax laterally and posteriorly, vertex and dorsum of thorax with elongate, erect but somewhat thinner pubescence, with a few dark hairs interspersed and a considerable amount of shorter, blackish pubesence on vertex laterally and on upper part of cheeks; scutum quite closely, deeply and distinctly punctate throughout, punctures of scutellum slightly finer but very close, and axillae with very fine, densely crowded punctures; pleura rather dull, punctures very close, rather coarse below, becoming fine above; propodeum somewhat smoother but dull, with only exceedingly minute and vague punctures evident; front coxal spines rather short but erect and rather slender, subacute, surface of coxa with a small patch of short, fuscous setae just anterior to the spine; mid tibial spurs rather short but distinct; front basitarsi somewhat dilated and quite deeply excavated, although largely black, becoming somewhat yellowish along posterior margin, following segments also yellow along posterior margin, segments 1-3 with a prominant posterior fringe of elongate, white hairs; tegulae somewhat shining, very minutely and closely punctate; wings subhyaline, veins brownish-testaceous; terga 2-4 shallowly depressed at base, but hardly grooved, basal margin abrupt but not carinate, apical margins of terga rather broadly depressed, more so laterally, these with thin and obscure, whitish, apical fasciae at extreme sides of 2 and 3, a more complete one on 4; terga 1 and 2 with rather elongate but thin, erect, pale pubescence, discal pubescence on 3 and 4 rather elongate, pale basally, becoming blackish apically and largely black on 5; punctures of all terga very fine, well separated or sparse medially, becoming somewhat closer at extreme sides; tergum 5 not fasciate, punctures minute and well separated throughout, 6 closely and minutely punctate above, carina consisting of a pair of triangular, sublateral, carina-like lobes which form a rounded, median, emarginate area, median teeth of apical margin subacute, quite distinct but carinate, much more widely separated from each other than to the obscure, lateral angles which are hardly produced as definite teeth; tergum 7 short, but rather broad and transverse, not at all angulate medially, but bearing an apical tuft of elongate pubescence; sterna 1-4 largely exposed, shining, very minutely and quite sparsely punctate in general, apical margins depressed, more or less yellowish-hyaline, but not at all fasciate, the plates largely bare; setose area of sternum 5 very short, transverse, with short, scale-like setae (fig. 44); sternum 6 with a transverse, linear patch of long, flexed setae on each side, apical lobe broad and very short, angulate at each side; gonocoxites constricted near base, flattened and dilated apically, flexed ventrally, apex narrowly produced (fig. 45).

DISTRIBUTION—Mackenzie to Nova Scotia, south to California and Georgia, April to August.

FLOWER RECORDS—*Apocynum, Asclepias, Baptisia, Campanula, Chrysanthemum, Clematis, Coreopsis, Geranium, Gerardia, Hydrangea, Philadelphus, Pycnanthemum, Rhododendron, Rubus, Rudbeckia, Solidago, Trifolium, Vaccinium* and *Vicia.*

Megachile (Delomegachile) ingenua Cresson

(Figs. 43-45)

Megachile ingenua Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 122. ♂.

Megachile tephrosiana Mitchell, 1927. Psyche 34, p. 179. ♀.

Megachile (Delomegachile) ingenua Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 188.

FEMALE — Length 13-15 mm.; entirely black, including tegulae and legs, spurs more brownish-piceous; eyes subparallel; clypeal margin about straight, the rather broad, median area narrowly shining and impunctate; mandibles very broad, 4-dentate, but inner tooth very broadly truncate (fig. 43); lateral ocelli subequally distant from eyes and margin of vertex; cheeks much broader than eyes; vertex shining, punctures quite deep and distinct, rather fine, quite close medially, well separated to almost sparse laterally, becoming minute and close on cheeks below; face below ocelli with densely crowded punctures, rather fine medially, becoming minute laterally, supraclypeal area and clypeus with a median, shining, impunctate area, becoming very closely and deeply punctate on each side; pubescence short but rather copious and entirely pale around antennae and sides of face, somewhat thinner on cheeks below, quite dense, entirely white on thorax laterally and posteriorly, vertex with very short, erect, piceous or blackish pubescence; scutum with copious, erect but rather short, blackish pubescence across posterior half and scutellum with considerable erect, more elongate, dark pubescence; scutum and scutellum shining, punctures minute on scutum medially, rather widely separated, becoming more distinct around margins, median punctures of the scutellum rather sparse and minute, becoming quite close laterally, axillae very finely and closely punctate; pleura rather dull, punctures densely crowded, becoming minute above; propodeum smooth but very dull, with only very minute, shallow and rather vague punctures evident; all basitarsi shorter and somewhat narrower than their tibiae; tegulae somewhat shining, impunctate posteriorly but with scattered, minute and irregular punctures toward anterior margin; wings subhyaline, veins brownish-testaceous; abdominal terga 2 and 3 quite deeply grooved across base, basal margin of groove distinct, but only obscurely carinate, 4 and 5 slightly impressed toward the base but not definitely grooved, apical margins of terga narrowly depressed, with dense, whitish fasciae that are entire on 2-5, discal pubescence very short but copious and black, tergum 1 with more erect, loose, entirely white pubescence; punctures fine, slightly separated medially on all terga, becoming, quite close at extreme sides; tergum 6 nearly straight, with abundant, erect, black pubescence visible in profile, punctures very fine and densely crowded; sternum 6 quite uniformly, densely covered with short, black, scopal hairs; scopa otherwise pale yellow, but with a few, elongate black hairs at extreme sides on sterna 3-5, and 5 with an additional row of black hairs across posterior margin, the more basal sterna densely and finely punctate, punctures becoming somewhat coarser on the more apical sterna, sternal fasciae not evident.

MALE — Length 10-12 mm.; black, including tegulae, and legs in large part, anterior tarsi yellow, and spurs yellowish-testaceous; eyes subparallel; clypeal margin nearly straight; mandibles 4-dentate, with an acute, basal, inferior process, lower margin with a small, submedian angle; apical segment of flagellum not appreciably dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks much broader than eyes, slightly excavated below, posterior margin of this produced as a rather stout, pubescent tubercle; punctures of vertex quite deep and distinct, rather fine, close medially, becoming very slightly separated laterally, but very fine and densely crowded on cheeks below, a transverse shining line on lower part of cheeks that is margined on each side by a rather dense, fringe of short, white hairs; face below ocelli very finely and quite densely punctate, the more lateral areas and supraclypeal area with minute and densely crowded punctures, clypeus narrowly impunctate toward base medially, becoming closely and very finely punctate on each side and toward apical margin; pubescence yellowish-white, quite copious and elongate around antennae and lower part of face, becoming snowy white on cheeks below, rather dense but shorter and thinner above, vertex with intermixed, elongate, white hairs and very short, fuscous hairs; pubescence whitish and quite copious on thorax laterally and posteriorly, scutum with intermixed dark and light hairs on posterior half; punctures of scutum quite deep and distinct, uniformly close, only slightly separated in center, scutellum rather sparsely punctate in mid-line but rather closely so on each side, punctures of axillae very fine and crowded; pleura rather dull, punctures rather fine and densely crowded, becoming even finer above; propodeum smooth but dull, with only vague, minute, and irregular punctures evident; front coxal spines short but distinct, conspicuously divergent, subtriangularly carinate, not much longer than the breadth at base, coxae with considerable dense, white pubescence anteriorly but without ferruginous bristles; midtibial spurs well developed; front basitarsi very slightly dilated toward apex but rather deeply

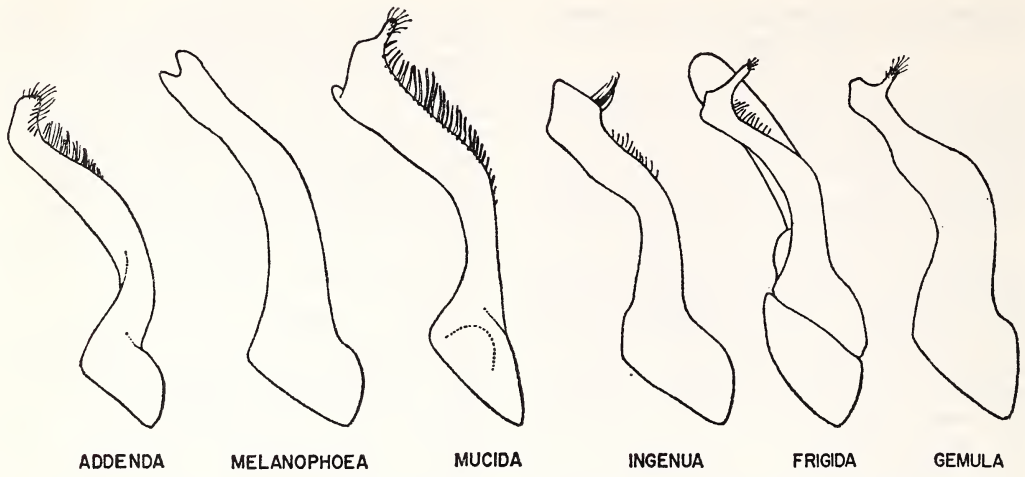


Figure 45—Lateral view of gonocoxites in males of *Megachile (Delomegachile).*

excavated, entirely yellow, the excavation more or less reddish, following tarsal segments short but yellow and slightly dilated, with a rather thin, posterior, whitish fringe; tegulae shining, with only exceedingly minute and rather sparse punctures except along anterior margin; wings subhyaline, veins brownish-testaceous; abdominal terga 2 and 3 rather deeply grooved across base, basal margin of each somewhat carinate, 4 and 5 somewhat depressed at base but hardly grooved, apical margins of the terga shallowly depressed, with whitish apical fasciae, these more or less interrupted in the more basal terga; tergum 1 with elongate, rather thin, entirely whitish pubescence, that on 2 also somewhat elongated and entirely white, discs of 3-5 black pubescent, this rather short but erect and quite dense; punctures of terga very fine, rather widely separated medially, becoming somewhat closer at extreme sides, tergum 6 shining, punctures exceedingly minute and vague, carina consisting of a pair of more or less triangular lateral protuberances which delimit a median, triangular emarginate area, these protuberances irregularly serrate in part, median teeth of apical margin rather small, subcarinate, somewhat nearer lateral angles than to each other, lateral teeth not evident; tergum 7 transverse, rather short, slightly and shallowly excavated, rounded apically; sterna 1-4 exposed, shining, very minutely and quite sparsely punctate especially on the more apical sterna, apical margins depressed and somewhat hyaline, but not fasciate; setose area of sternum 5 reduced, widely separated from the sclerotized basal and lateral areas by a more membraneous region, finely setose (fig. 44); sternum 6 with a pair of densely setose areas that nearly meet medially, apical lobe quite broad, short medially, lateral angles conspicuously produced; gonocoxites abruptly constricted above base, subacute apically, with a ventral, subapical protuberance (fig. 45).

DISTRIBUTION—Illinois to Pennsylvania, south to Florida, March (in Florida) to July.

FLOWER RECORDS—*Lupinus, Tephrosia* and *Vaccinium.*

Megachile (Delomegachile) melanophoe melanophoea Smith

(Figs. 43-45)

Megachile melanophoea Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 191. ♀♂.

Megachile canadensis Friese, 1903. Ztschr. System. Hym. Dipt. 3, p. 248.

Megachile melanophoea Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 336.

Megachile (Delomegachile) melanophoea Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 190.

FEMALE — Length 12-14 mm.; entirely black, including tegulae and legs, spurs brownish-testaceous; eyes subparallel; clypeal margin straight, very finely crenulate; mandibles 4-dentate, inner tooth very slightly emarginate, giving an approach to a 5-dentate condition (fig. 43); lateral ocelli very slightly nearer margin of vertex than to each other; cheeks much broader than eyes; punctures of vertex quite deep and distinct, rather fine, close medially, becoming well separated laterally, fine and close on cheeks above, densely crowded and minute below; face below ocelli

dull and densely rugose, supraclypeal area shining, punctures fine and slightly separated, clypeus with a median, shining, sparsely punctate line, densely punctate on each side; pubescence yellowish-white around antennae and lower part of face, vertex with erect, elongate, pale hairs intermixed with shorter, fuscous hairs, pubescence becoming largely fuscous on cheeks; thorax with copious, elongate, yellowish-white pubescence laterally and posteriorly, scutum and scutellum with long, erect pubescence which is pale anteriorly, but in large part fuscous across posterior half of disc and in part on scutellum; scutum shining, punctures quite deep and distinct, moderately coarse, rather sparse in center of disc, becoming close laterally; scutellum with fine and rather sparse punctures in mid-line but becoming rather closely punctate on each side, punctures of axillae very fine and crowded; pleura dull, punctures fine and very close, becoming minute and crowded above; propodeum smooth but dull, with only exceedingly vague, shallow and minute punctures evident; mid and hind basitarsi about as broad as their tibiae, but somewhat shorter; tegulae smooth but rather dull, with only exceedingly minute punctures evident anteriorly; wings subhyaline, veins brownish-piceous; abdominal terga 2 and 3 shallowly depressed across base, hardly grooved, basal margin evident but not sharply carinate, apical margins of 2-4 only very shallowly but rather broadly depressed, entirely lacking fasciae, discal pubescence of 1 and 2 long, erect, quite copious, and entirely pale, quite long, erect and entirely black on 3-6, largely subappressed on 6; median punctures of terga exceedingly minute and quite sparse, becoming closer laterally, tergum 6 densely and finely punctate throughout; sternum 6 well covered with scopal hairs, these becoming somewhat sparse toward apex which is fringed with short, relatively pale hairs; scopa largely reddish, more or less tinged with fuscous toward base, the more basal sternal plates very closely and rather finely punctate, somewhat more widely separated apically on the apical sterna, apical margins narrowly yellowish-hyaline, no sternal fasciae evident.

MALE — Length 9-12 mm.; black, including tegulae and mid and hind legs, front legs testaceous in large part; eyes subparallel; clypeal margin shallowly emarginate on each extreme side, otherwise straight and entire; mandibles 4-dentate (fig. 43), outer margin obtusely angulate medially, basal, inferior process triangular, with a broad base; apical segment of flagellum flattened and quite broadly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks somewhat broader than eyes, with a blunt tubercle on lower posterior angle, with a deep, narrow excavation between this and base of mandible; vertex somewhat shining, punctures fine and close medially, becoming well separated laterally, very fine and close on cheeks above, becoming minute and densely crowded below, area below ocelli dull, rather finely rugosopunctate, becoming very finely and densely punctate on sides of face and on supraclypeal area, clypeus somewhat shining beneath pubescence, punctures very fine and slightly separated over most of disc; pubescence yellowish-white, quite copious around antennae and over lower half of face, becoming somewhat thinner but long and erect on vertex, with a few dark hairs intermixed, very short and thin in general on cheeks, but with a transverse line of elongate, whitish hairs toward inferior margin; pubescence of thorax rather copious, elongate, yellowish-white laterally and posteriorly, scutum with elongate, erect pubescence which is somewhat thinner, pale anteriorly, to a considerable degree fuscous over posterior half, with some intermixed fuscous hairs on scutellum; scutum somewhat shining, punctures quite deep and distinct, rather fine, well separated in center of disc, but very close elsewhere, finer and uniformly close on scutellum and axillae, pleura dull, punctures very fine, shallow and quite densely crowded, propodeum somewhat smoother but dull, posterior face with close, shallow, minute and rather obscure punctures evident; front coxal spines subtriangular, acute at tip, rather short but well developed, with elongate, pale pubescence posteriorly, a dense, transverse patch of short, brownish bristles at base of each spine, coxae otherwise largely bare; mid tibial spurs short but well developed; front tarsi entirely yellowish-testaceous, basitarsus broadly dilated and very deeply excavated, apex fully as broad as the tibiae, following segments short, posterior margin with a quite dense fringe of yellowish-white hairs, intermixed with fuscous at tips; front tibiae yellowish at apex and testaceous on anterior and posterior faces, outer face blackish; front femora largely testaceous, with a piceous band from base to apex on posterior face, rather prominantly whitish-fringed posteriorly; tegulae somewhat shining, rather closely and minutely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2 and 3 shallowly depressed toward base, basal margin of this distinct but not conspicuously carinate, following terga only faintly impressed at base, apical margins shallowly but rather broadly depressed, not at all fasciate, discal pubescence of terga 1 and 2 and base of 3 entirely pale, erect, quite copious, that on 4 and 5 largely blackish, erect and quite copious, also apical portion of 3 blackish in large part; punctures of terga medially very minute, well separated, becoming quite close at extreme sides; tergum 6

densely and finely punctate above, margin of carina irregularly crenulate, with a deep, rounded, median emargination, median teeth of apical margin much elongated, slightly narrowed and abruptly truncate at tip, slightly nearer the low, subangulate. lateral teeth than to each other; sternum 7 conspicuous, acutely pointed medially; sterna 1-4 exposed, shining, punctures very fine but rather close on the more basal plates, becoming minute and vague on the more apical sterna, apical margin of each narrowly but deeply and abruptly depressed, yellowish-hyaline, rather prominantly fringed toward sides; setose area of sternum 5 very broad and extensive, setae short and fine (fig. 44); sternum 6 with broad, densely setose areas that nearly meet medially and are much narrowed laterally, apical lobe very broad, lateral angles produced, rounded, lateral areas of the sternum with conspicuous apical tufts of setae; gonocoxites somewhat constricted above base, slender apically, apex bilobate (fig. 45).

DISTRIBUTION—Mackenzie to Newfoundland, south to California, Colorado and Pennsylvania, June to August. The Georgia record given in the Revision (Mitchell 1935, p. 193) now seems improbable.

FLOWER RECORDS—*Agastache, Apocynum, Astragalus, Azalea, Campanula, Cypripedium, Epilobium, Helianthus, Lupinus, Medicago, Phacelia, Psoralea, Ranunculus, Raphanus, Rhodora, Rosa, Rubus, Rudbeckia, Symphoricarpus, Taraxacum, Trifolium* and *Vicia.*

Megachile (Delomegachile) melanophoea submelanophoea Mitchell

Megachile (Delomegachile) melanophoea var. *submelanophoea* Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 197. ♀.

This form is very similar to typical *melanophoea,* but the scopa is entirely deep black. It may also be separated from other related forms by the entirely black pubescent cheeks, legs and pleura, while the vertex, scutum, scutellum and terga 1 and 2 are entirely pale ochraceous pubescent, without black intermixture.

DISTRIBUTION—Formerly known only from California, specimens have now been identified from Michigan and Maine, collected in June.

FLOWER RECORDS — *Dicentra* and *Lupinus.*

Megachile (Delomegachile) mucida Cresson

(Figs. 43-45)

Megachile mucida Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 118. ♂. (♀ misident.)
Megachile mucida semimucida Cockerell, 1909. Ann. Mag. Nat. Hist. (8) 4, p. 26. ♀ ♂.
Megachile audax Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 161. ♂.
Megachile (Delomegachile) mucida Mitchell, 1935. Amer. Ent. Soc. Trans. 61, p. 197.

FEMALE — Length 13-15 mm.; entirely black, including tegulae and legs, spurs brownish-testaceous; eyes subparallel; clypeal margin about straight; mandibles 4-dentate, 3rd tooth narrowly truncate, inner tooth narrowly rounded (fig. 43); lateral ocelli considerably nearer margin of vertex than to eyes; cheeks subequal to eyes in width; vertex somewhat shining between deep and distinct punctures, these fine and close medially, becoming somewhat more coarse and distinctly separated laterally, minute and close on cheeks; face below ocelli rather finely and densely rugoso-punctate, supraclypeal area shining and sparsely punctate medially, becoming very closely and quite finely punctate laterally, clypeus with a narrow, median, sparsely punctate and shining line, densely, finely and quite deeply punctate on each side of this; pubescence quite copious but not very long around antennae, becoming quite short, erect and largely fuscous on supraclypeal area and clypeus, rather short, erect and largely pale on vertex, with dark hairs intermixed, entirely fuscous on cheeks; pubescence of thorax dense, erect and quite long, entirely yellowish-white on dorsal and posterior surfaces and on upper part of pleura, black on pleura below and on venter, legs entirely black pubescent; scutum quite deeply, distinctly and densely punctate, somewhat separated only in center of disc, scutellum with a narrow, median impunctate line, finely and densely punctate on each side and axillae minutely and densely punctate; pleura somewhat shining, punctures on venter quite sparse and rather shallow, becoming minute and densely crowded above; propodeum smooth, dull, punctures of posterior face quite close, minute and obscure; mid and hind basitarsi about as broad as their tibiae but considerably shorter; tegulae very finely and rather closely punctate, somewhat shining; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 shallowly depressed across base, basal margin distinct but not sharply carinate, apical margins of the terga rather broadly and shallowly depressed, completely lacking fasciae; discal pubescence of tergum 1 entirely pale, quite long, erect and copious, that on basal half of 2 similar but the narrow, apical portion with

quite dense, fuscous pubescence, discs of 3-5 covered with dense, rather short, erect, copious, fuscous pubescence; punctures minute, quite close throughout, sparse only toward base of the more basal terga; tergum 6 about straight in profile with abundant but rather short, erect, fuscous hairs, minutely and very closely punctate throughout; sternum 6 well covered with rather short, black, scopal hairs, scopa densely fuscous or black throughout, the sterna finely and densely punctate, punctures becoming slightly coarser and more widely separated on the more apical plates, sternal fasciae not evident.

MALE—Length 10-12 mm.; black, including tegulae and mid and hind legs, front legs in large part yellowish or testaceous; eyes parallel; clypeal margin very slightly outcurved medially, finely crenulate; mandibles rather obscurely 4-dentate (fig. 43), outer margin evenly rounded, basal, inferior process elongate and acute with a broad base; apical segment of flagellum rather elongate but quite broadly dilated, strongly flattened; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks somewhat broader than eyes, quite deeply excavated below lower end of eye, posterior margin of excavation with a broad, carinate tubercle; vertex finely and quite densely punctate medially, punctures becoming slightly coarser and more distinct laterally, minute and densely crowded on cheeks, area below ocelli densely and very finely rugose, and entire area below antennae with very fine, densely crowded punctures; pubescence around antennae and over lower part of face copious and erect, entirely yellowish-white, becoming somewhat thinner but long and erect on vertex and upper cheeks, pale except for short fuscous hairs evident on vertex laterally and along outer orbits, cheeks below with a patch of dense, snowy-white, appressed pubescence; pubescence of thorax largely pale, erect and copious, yellowish-white over dorsum and somewhat more whitish on vertex and propodeum; central punctures of scutum distinct and slightly separated but otherwise rather fine and densely crowded, scutellum with a median, narrow, impunctate line, densely and finely punctate on each side and on axillae; pleura uniformly, densely and very finely punctate, propodeum somewhat smoother but rather dull, with very minute, shallow and vague but quite close punctures, especially on posterior face; front coxal spines spatulate, rather narrow, narrowly rounded apically, densely white pubescent posteriorly, with a dense patch of yellowish setae at base on the coxae, a dense patch of snow-white pubescence of each coxa laterally; mid tibial spurs short but well developed; front tarsi entirely pale yellow, basitarsus much elongated and dilated, sides parallel, very deeply excavated, apex projecting over segment 2 nearly to its tip, posterior margin of tarsi with a dense, yellowish-white fringe of rather long hairs, these tipped with brown in large part; outer face of front tibiae piceous, apex yellow, anterior and posterior faces largely testaceous; posterior face of front femora piceous toward tip, otherwise entirely testaceous, quite densely pale pubescent posteriorly; tegulae very finely and quite closely punctate, somewhat shining; wings subhyaline, veins brownish-testaceous; abdominal terga 2-4 shallowly depressed across base, apical margins broadly and quite distinctly depressed, but not at all fasciate, discal pubescence of basal tergum copious, long and erect, entirely yellowish-white, that on 2 yellowish-white across base but more or less fuscous toward apical margin, discal pubescence of 3-5 copious, rather elongate, dense and erect, entirely fuscous or black; punctures of terga very minute, well but not widely separated medially, becoming very close at extreme sides; tergum 6 quite dull, densely and minutely punctate, carina nearly entire on each side, with a rather shallow, rounded, median emargination, median teeth of apical margin carinate, very widely separated, lateral teeth hardly evident; tergum 7 triangularly pointed medially, quite broad and conspicuous; sterna 1-4 exposed, somewhat shining, minutely and rather closely punctate, apical margins quite abruptly and rather narrowly depressed and yellowish-hyaline, with sparse but rather elongate and suberect, pale hairs; setose area of sternum 5 quite extensive, setae fine, minutely plumose (fig. 44); sternum 6 with broad, densely setose areas that nearly meet medially, setae long and robust, apical lobe broad, produced medially, lateral angles acute; gonocoxites constricted above base, slightly dilated and sinuate above, apex narrowly produced, with a short, subapical, ventral lobe (fig. 45).

DISTRIBUTION—New Jersey to Georgia and Texas, April to June.

FLOWER RECORDS—*Lupinus, Polycodium, Rubus* and *Tephrosia.*

Megachile (Megachiloides) oenotherae (Mitchell)

(Figs. 46, 47 & 55)

Megachiloides oenotherae Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 154. ♀ ♂.
Megachile (Megachiloides) oenotherae Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 151.
Megachile (Megachiloides) oenotherae Sivik, 1954. Ent. News 65, p. 256. (biology)

FEMALE—Length 11 mm.; entirely black, including tegulae and legs, tibial spurs yellow;

eyes subparallel; clypeal margin about straight, with a very shallow, emarginate area on each extreme side; mandibles 3-dentate, a long bevelled edge between the 2nd and 3rd teeth (fig. 47); glossa extremely long, reaching nearly to tip of abdomen, and 2nd segment of labial palpi about four times length of the 1st; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks very slightly broader than eyes; vertex somewhat shining, punctures quite deep and distinct, rather fine and close between ocelli medially, becoming slightly more coarse and distant on each side, close on cheeks, rather fine above, somewhat coarser below; face with some shining spaces just below anterior ocellus, but otherwise very finely and closely punctate, supraclypeal area somewhat more coarsely and densely so, punctures quite uniformly close and deep on clypeus; pubescence of face below ocelli rather copious, white, that on cheeks white and rather thin above, becoming somewhat longer below, black between ocelli and across vertex; pubescence whitish, rather copious on thorax laterally and posteriorly, but largely black on scutum, hairs erect, quite copious, becoming pale at extreme sides and across anterior margin, scutellum with a few, black hairs interspersed through the generally pale, erect pubescence; scutum and scutellum quite closely, deeply and distinctly punctate, punctures slightly separated medially, becoming crowded between notaulices and tegulae and on scutellum laterally, axillae very finely and densely punctate; punctures of pleura rather coarse, quite close but shallow below, becoming somewhat finer above; lateral faces of propodeum rather smooth but dull, posterior face with rather close but very minute and vague punctures; all basitarsi distinctly shorter and narrower than their tibiae; tegulae minutely and closely punctate; wings subhyaline, veins piceous; abdominal terga 2-5 rather shallowly grooved or depressed across base, basal margin of these subcarinate, apical margins of terga quite deeply depressed laterally, less so medially on the more basal terga, densely white fasciate, these very narrow medially on 2 and 3, but complete on all; tergum 1 with copious, long and erect, whitish pubescence, discal pubescence of 2 pale, rather long and erect in large part, with a few black hairs laterally, that of 3-6 black, rather short but quite dense and erect; punctures very fine and close on terga 1 and 2, slightly coarser and more distinctly separated on 3-5, 6 very slightly concave in profile, with abundant, erect, black pubescence visible, a few pale, appressed hairs toward tip, punctures very fine and close throughout; sternum 6 well covered with rather short, black, scopal hairs, with a dense fringe of very short, dark hairs along apical margin; scopa otherwise very pale yellowish or whitish; punctures of sternum 2 quite fine and close, becoming somewhat more coarse and sparse on 3-5, apical margins depressed and obscurely hyaline, sternal fasciae absent.

MALE—Length 9 mm.; black, including legs in large part, tegulae somewhat more brownish, spurs pale yellow; eyes subparallel; clypeal margin straight beneath the dense beard; mandibles 3-dentate, with a rather slender, sharply acute, basal inferior process; glossa extremely long, reaching nearly to tip of abdomen, 2nd segment of labial palpus fully four times the length of segment 1; apical segment of flagellum slender; lateral ocelli very slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width, obscurely angulate below; vertex somewhat shining, punctures deep and distinct, quite uniformly and slightly separated, becoming somewhat finer and closer on cheeks below, some shining spaces just below anterior ocellus, face otherwise very finely and closely punctate throughout; pubescence white, quite elongate and copious on face, clypeus and lower half of cheeks, elongate and erect but rather thin on vertex and cheeks above, largely pale, with scattered, somewhat shorter, black hairs intermixed; pubescence white and quite copious on thorax laterally and posteriorly, scutum with a transverse patch of fuscous pubescence over posterior half, more distinctly whitish anteriorly, scutellum with a few, fuscous hairs intermixed with the generally white, erect pubescence; punctures of scutum quite deep and distinct, close in general, slightly separated only in center, and slightly separated in mid-line of scutellum but quite finely and closely punctate on each side, punctures of axillae very fine and densely crowded; pleura rather dull, punctures shallow but close, slightly coarser below, fine and densely crowded above; lateral faces of propodeum smooth but dull, posterior face with rather close, minute and somewhat vague punctures; front basitarsus slightly dilated, nearly equalling its tibia in width, and shallowly excavated anteriorly, following segments more or less testaceous, posterior fringe dense and white but rather short; front femur quite broadly dilated medially, lower margin strongly bowed and subcarinate, entirely piceous; front coxal spines slender and elongate, subacute apically, coxae largely bare but each with a small patch of inconspicuous pale bristles at base of spine; mid tibial spurs well developed, mid tarsi with a rather thin but elongate posterior fringe, basitarsi quite narrow and short relative to the tibiae; tegulae minutely and closely punctate; wings subhyaline, veins, brownish-piceous; abdominal terga 2-5 slightly depressed across base, basal margin of depression subcarinate, apical margins of terga rather deeply

but narrowly depressed laterally, these not evident medially on the more basal terga, but complete and deeper on the more apical terga, quite densely white fasciate, especially laterally; discal pubescence of terga 1 and 2 quite copious and elongate, entirely white, tergum 3 with a few, black hairs toward apical margin but pale basally, largely black, erect and rather copious on 4 and 5; punctures of terga 1 and 2 very fine and uniformly close, becoming somewhat more distinctly separated on 3 and 4, rather irregular and substriate on 5, carina of 6 subtriangular in outline, entire medially, margin with a few irregularities on each side, the carina slightly downcurved at tip, median teeth of apical margin broadly and conspicously carinate, subequally distant from each other and the obscure, lateral angles which are not definitely dentate; tergum 7 triangularly acute; sterna 1-4 exposed, very finely and rather closely punctate, punctures becoming sparse apically on 3 and 4, apical margins narrowly depressed and hyaline, rather thinly long pubescent; sternum 5 with rather extensive, distinctly delimited, apical, pubescence plates on each side, setose area rather broad and short, separated from basal margin by a membraneous area, partially divided medially and well covered with robust, apically dilated setae (fig. 46); sternum 6 with small, well separated, setose areas, setae flexed apically, apical lobe quite expansive, broader than long, lateral angles slightly produced; gonocoxites narrowed above base, robust apically, slightly sinuate, obliquely compressed, slightly dilated and short setose apically (fig. 55).

DISTRIBUTION—New Jersey to Texas and Oklahoma, May and June.

FLOWER RECORDS—This collects pollen from *Oenothera laciniata*, but has also been collected visiting *Ceanothus meriolex* and *Pentstemon*.

Megachile (Xeromegachile) brimleyi Mitchell

(Figs. 47-49)

Megachile brimleyi Mitchell, 1926. Amer. Ent. Soc. Trans. 52, p. 114. ♂.

Megachile (Xeromegachile) brimleyi Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 344. ♀ ♂.

FEMALE—Length 12 mm.; entirely black including tegulae and legs, mid and hind spurs brownish; eyes subparallel; clypeal margin very slightly incurved, minutely denticulate; mandibles 4-dentate, a bevelled edge between the 3rd and 4th teeth (fig. 47); lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; vertex somewhat shining, punctures deep and distinct, quite close and rather fine medially, becoming quite sparse on each side, rather fine and close on cheeks above, becoming somewhat coarser and more widely separated below; face

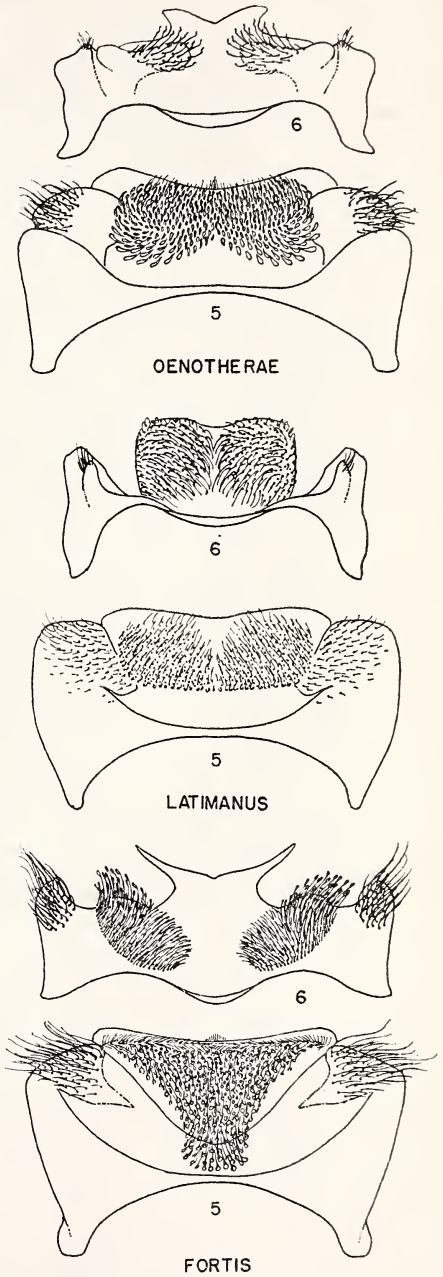


Figure 46
Sterna 5 and 6 in males of *Megachile (Megachiloides)*, *M. (Xanthorsarus)* and *M. (Phaenosarus)*.

below anterior ocellus with quite distinct and close punctures, becoming very close and fine between antennae and eyes, deep, distinct and slightly separated on supraclypeal area, upper margin of clypeus very finely and closely punctate, becoming rather irregularly and more coarsely punctate apically; pubescence largely whitish on head, rather short and dense around antennae, on sides of face and on cheeks below, rather short and thin on cheeks above and across vertex, entirely white on thorax laterally and posteriorly, very dense around tubercles beneath tegulae, and to some degree behind wing bases; scutum and scutellum with very short, erect and rather thin, fuscous pubescence, becoming more or less whitish on scutum anteriorly, and with a pair of oblique, rather short, dense lines of whitish tomentum, a small spot of tomentum back of each tegula and a line of tomentum in the scutello-mesothoracic suture; scutum rather dull, quite closely and deeply punctate throughout, punctures slightly separated in center, those on scutellum uniformly very close and somewhat finer, rather fine and densely crowded on axillae; pleura with densely crowded, rather fine punctures above, but these becoming more coarse, shallow and rather widely separated below; lateral faces of propodeum somewhat shining, with very shallow but rather close punctures evident, posterior face with scattered, very minute and obscure punctures; mid and hind basitarsi almost as broad as their tibiae, but distinctly shorter; tegulae very minutely and closely punctate; wings subhyaline, becoming slightly clouded apically, veins brownish; abdominal terga 2 and 3 shallowly grooved across base, basal margin of the grooves only subcarinate, apical margins of terga rather distinctly depressed laterally, very obscurely so, if at all, medially; terga 1-5 with dense, entire but rather narrow, whitish, apical fasciae, discal pubescence of basal tergum rather copious, long and erect, entirely whitish, that on following terga very short, inconspicuous and largely fuscous; punctures very fine and close on terga 1 and 2, becoming somewhat more distinct but still fine on 3-5, 6 about straight in profile, with a few suberect, pale hairs evident in profile, largely covered with pale tomentum in dorsal view, punctures very fine and densely crowded throughout; sternum 6 quite well covered with dark, scopal hairs, apical fringe short and dense; scopa otherwise creamy-white, with a few black hairs across apex of sternum 5, the more basal sterna very closely and finely punctate, punctures becoming somewhat more coarse and sparse apically, apical margins narrowly hyaline, no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae more brownish-testaceous, front tarsi pale yellowish, mid and hind spurs brownish-testaceous; eyes very slightly convergent below; median third of clypeal margin very slightly produced; mandibles 3-dentate, inferior process sub-basal, slender and acute; apical segment of flagellum very slightly dilated; lateral ocelli very slighty nearer eyes than to margin of vertex; cheeks somewhat narrower than eyes, obscurely angulate below; vertex shining, punctures deep and distinct, rather coarse and well separated laterally, becoming slightly closer medially and between ocelli, close and fine on cheeks punctures below anterior ocellus slightly separated, rather coarse, becoming fine and densely crowded on lower portions of face and clypeus beneath dense pubescence; pubescence creamy-white, quite dense on face around and below antennae, more whitish on cheeks, thin above, somewhat more elongate below, short and thin but largely pale on vertex; thorax with rather copious, somewhat elongate, white pubescence laterally and posteriorly, scutum in large part covered with very short thin, black pubescence, becoming somewhat more elongate and whitish anteriorly, with a pair of slightly oblique lines of pale tomentum anteriorly, the scutello-mesothoracic suture white tomentose, and scutellum with a few dark hairs interspersed in the generally pale and more elongate pubescence; punctures of scutum and scutellum quite deep and distinct, slightly separated only in center of scutum, moderately coarse, somewhat finer but uniformly slightly separated on scutellum, fine and close on axillae; pleura dull, punctures rather shallow but contiguous, becoming quite densely crowded above; lateral faces of propodeum somewhat smoother but very shallowly, obscurely and closely punctate, posterior face with very minute, vague and close punctures; front coxal spines very broad at base, subtriangular and somewhat flattened, tips narrowly rounded, densely long white pubescent posteriorly and with a small patch of short, testaceous bristles at base, coxae otherwise bare and shining; front tarsi pale yellow, faintly brownish along margins and toward apex, basitarsus slightly dilated but not equalling the tibiae in width, rather shallowly excavated anteriorly, posterior fringe entirely pale, quite dense but rather short; front tibiae piceous on outer face, more or less testaceous on the other two faces; front femora piceous on posterior face, becoming brownish toward the subcarinate lower margin, anterior surface highly polished and testaceous; mid tarsi narrow, not much modified, but with a very long, white, posterior fringe; mid tibial spurs well developed; hind basitarsi quite short and slender; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga

2-5 shallowly depressed across base, basal margins of these subcarinate, apical margins of 1-5 with complete, dense, white tomentose fasciae, these rather narrow, and margins distinctly depressed laterally on the more basal terga, more completely depressed on the more apical terga; tergum 1 with rather elongate, thin, entirely whitish pubescence, discal pubescence of 2-5 very short, suberect and largely fuscous; punctures of terga very fine and close basally, becoming somewhat more distinctly separated but still quite close on the more apical terga; tergum 6 thinly pale tomentose, punctures close but rather irregular, carina broadly rounded, with no evidence of a median emargination, median teeth of apical margin broadly carinate, somewhat nearer the small, acute lateral angles than to each other; tergum 7 largely hidden, transverse and not produced medially; sterna 1-4 exposed, punctures rather fine but well separated, especially on the more apical sterna, apical margins rather abruptly depressed, yellowish-hyaline, thinly fasciate, hairs elongate and entirely pale; sternum 5 with well defined, lateral, pubescent, apical plates, area between filled by the rather broad and expansive setose area, setae rather sparse, simple along apical margin but becoming robust, elongate and apically dilated toward base, apical margin with a median, dense tuft of fine hairs (fig. 48), sternum 6 with poorly defined but rather extensive setose areas on each side of mid-line, setae sinuate, rather sparse, apical lobe broader than long, acutely angulate laterally; gonocoxites narrowed above base, sinuate, slightly dilated apically, bearing numerous elongate hairs (fig. 49).

DISTRIBUTION—This is limited to the narrow coastal region of the southeastern states, from North Carolina to Florida, July and August.

FLOWER RECORDS—This visits *Galactia* primarily, but has been collected on *Erigeron.*

Megachile (Xeromegachile) dakotensis Mitchell

(Figs. 48 & 49)

Megachile dakotensis Mitchell, 1926. Psyche 33, p. 164. ♂ ♀.

Megachile (Xeromegachile) dakotensis Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 335.

FEMALE—Length 13 mm.; black, tegulae brownish-testaceous, spurs yellow, legs black; eyes subparallel; clypeal margin straight; mandibles 4-dentate, a rather short bevelled edge between 3rd and 4th teeth; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks slightly broader than eyes; vertex somewhat shining, punctures quite distinct, rather shallow, a narrow, median, impunctate line reaching from anterior ocellus to margin of vertex, punctures quite close on each side of this, densely crowded between ocelli, becoming rather sparse laterally, close on cheeks in large part, but somewhat separated toward posterior margin above; punctures below anterior ocellus slightly separated, quite deep and distinct, becoming densely rugoso-punctate laterally and below, beneath rather dense pubescence, quite close medially on supraclypeal area, becoming densely crowded on each side, close and fine along upper margin of clypeus, but somewhat more coarse and distinct but still rather close apically; pubescence largely pale on head and thorax, rather short and dense around antennae, on sides of face and on cheeks below, very short and fuscous in part, across vertex; pubescence quite copious and rather short on thorax practically bare, (possibly denuded in material at hand); scutum rather dull, punctures fine, well separated medially, becoming rather close laterally and posteriorly, those of scutellum, very fine and close except along mid-line, very fine and densely crowded on axillae, pleura rather dull, punctures fine and very close, becoming crowded above; lateral faces of propodeum somewhat smoother but rather dull, punctures hardly evident, posterior face somewhat velvety, punctures very close but shallow and vague, becoming inevident medially; mid and hind basitarsi about as broad as their tibiae, hind pair nearly equal to their tibiae in length; anterior tarsi much narrower than their tibiae; tegulae with exceedingly minute, hardly visible but rather close punctures; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-piceous; abdominal terga 2-5 deeply and abruptly grooved across base, basal margins of grooves quite definitely carinate, apical margins of terga quite deeply depressed except on 1 and 2 medially, median areas of terga strongly convex, finely and quite closely punctate, with very short, black, erect pubescence visible laterally but inevident medially; tergum 6 about straight in profile, with no erect hairs visible, and only very short, erect, black hairs evident toward sides in dorsal view, narrowly rounded apically, apical half rather densely pale yellowish tomentose, basal half very minutely and closely punctate; sternum 6 rather well covered with short, black, scopal hairs, these becoming somewhat sparse toward apex, which is very narrowly fringed with short, black setae; scopa otherwise white, with only a few inconspicuous black hairs at extreme sides of sternum 5, the more basal

sterna closely and finely punctate, punctures becoming more widely separated on apical sterna; no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae more brownish-testaceous; anterior tarsi yellowish in part, spurs pale yellow; eyes subparallel; clypeal margin very slightly outcurved; mandibles 3-dentate, inferior process sub-basal, rather broadly triangular; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks very slightly broader than eyes, much narrowed below but not angulate; vertex shining, punctures deep and distinct, rather fine and quite close medially, becoming slightly more widely separated laterally, slightly separated on cheeks above toward posterior margin, much finer and densely crowded along margin of eyes, very close and fine below, quite deep and distinct, slightly separated below anterior ocellus, but otherwise very fine and densely crowded on face and clypeus; pubescence largely pale on head and thorax, with only scattered, erect, dark hairs intermixed with the generally pale yellowish hairs on vertex and scutum, face with copious, elongate creamy-white pubescence, dense and snowy-white on cheeks below, shorter and thinner above, copious and rather elongate on thorax laterally and posteriorly, yellowish across posterior half of scutum; scutum dull, very closely and finely punctate, punctures slightly separated only in center posteriorly, those of scutellum fine and close on each side of a somewhat shining median line, those on axillae very fine and close; pleura dull, punctures fine and close, becoming densely crowded above; lateral surfaces of propodeum somewhat shining, finely and shallowly but rather closely punctate, punctures of posterior face close, very minute and rather vague; front coxal spines distinct, very short not much longer than broad at base, narrowly rounded, densely long white pubescent posteriorly, coxae without definite patches of setae; front tarsi slender and unmodified, pale yellowish, more or less brownish on anterior and posterior margins, not at all excavated, with a quite dense, rather short, whitish, posterior fringe; mid tibial spurs well developed; mid tarsi quite short and slender, dark, with a much elongated, white, posterior fringe; hind basitarsi short and quite slender; tegulae very minutely and rather closely punctate; wings subhyaline, faintly clouded apically, veins brownish-piceous; abdominal terga 2-5 deeply grooved across base, basal margins of these sharply carinate, apical margins of terga deeply and quite abruptly depressed except on 1 and 2 medially, with entire, dense, whitish, apical fasciae on 2-5, basal tergum with quite copious, elongate, white pubescence which is quite dense at extreme sides, whitish discal pubescence of following terga evident only toward base of each plate; punctures fine and close, becoming subrugose at extreme sides of terga 4 and 5, 6 white tomentose basally, punctures fine, densely crowded and irregular, or surface more or less rugose, carina entire, quite broadly and evenly rounded, median teeth of apical margin broadly carinate, slightly nearer the small, acute lateral angles than to each other; tergum 7 largely hidden, with a very small, median, acute, apical angle; sterna 1-4 exposed, quite closely and finely punctate, apical margins quite abruptly and deeply depressed, narrowly hyaline, more or less densely fringed with white hairs; lateral pubescent plates of sternum 5 rather small but well defined, setose area broad but quite short medially, setae short and rather sparse, more or less dilated apically (fig. 48); sternum 6 with well separated, sublateral setose areas, setae short and robust, apical lobe broad and very short, lateral angles acute; gonocoxites constricted above base, slightly sinuate, much dilated apically, sparsely setose toward apex, tip with a tuft of elongate hairs (fig. 49).

DISTRIBUTION: Montana to Minnesota, Nebraska and Illinois, July and August.

FLOWER RECORDS—*Amorpha, Cleome, Helianthus, Kuhnistera, Petalostemon* and *Verbena.*

Megachile (Xeromegachile) deflexa Cresson

(Figs. 47-49)

Megachile deflexa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 125. ♂.
Megachile megagyna Cockerell, 1909. Canad. Ent. 41, p. 394. ♀.
Megachile indianorum Cockerell, 1913. Ann. Mag. Nat. Hist. (8) 11, p. 533. ♂.
Megachile (Xeromegachile) coreopsana Mitchell, 1934. Amer. Ent. Soc. Trans. 59, p. 319. ♂.
Megachile (Xeromegachile) deflexa Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 332.

FEMALE—Length 15-17 mm.; black, tegulae more brownish, legs black, spurs yellowish; eyes subparallel; clypeal margin narrowly produced and slightly incurved medially, with a small, median denticle; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth; lateral ocelli much nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining between deep, distinct, rather fine and close punctures, these becoming slightly separated laterally, punc-

tures of cheeks close and fine above, becoming somewhat coarser but still quite close below; face below ocelli quite densely rugoso-punctate, finely so between antennae and eyes, clypeus with quite coarse and deep punctures medially where they are slightly separated, but becoming fine and densely crowded on each side; pubescence whitish on face and cheeks, rather copious but short around antennae and at sides of face, somewhat elongate but rather thin on cheeks below, becoming short and thin above, very short but erect over entire vertex; pubescence whitish or cream color on thorax laterally and posteriorly, dorsum of thorax largely covered with extremely short, erect, fuscous or blackish pubescence, the scutello-mesothoracic suture with a line of pale tomentum; scutum quite deeply and distinctly punctate throughout, punctures somewhat coarser and more distinctly separated medially, becoming densely crowded laterally and posteriorly, scutellum somewhat more finely and very densely punctate throughout, punctures of axillae slightly more coarse, deep and distinct; pleura somewhat shining, punctures rather shallow but quite distinct, to some slight degree separated but becoming densely crowded above; lateral faces of propodeum quite smooth but rather dull, not distinctly punctate, posterior face with rather close, minute and indistinct punctures; mid and hind basitarsi about equal to their tibiae in breadth, hind pair equalling their tibiae in length also; front tarsi relatively slender; tegulae minutely and closely punctate; wings subhyaline, becoming rather deeply infuscated apically, veins brownish-testaceous; abdominal terga 2-4 rather deeply grooved across base, basal margin of grooves distinct but hardly carinate, terga 1-5 with complete, dense, yellowish, apical fasciae, apical margins rather sharply depressed laterally but only obscurely so medially on the more basal terga; tergum 1 with rather elongate, thin, yellowish pubescence medially, with a dense, yellowish patch of tomentum at each extreme side, discal pubescence of following terga very short, erect and fuscous; tergal punctures uniformly fine and quite close, becoming slightly coarser and more distinctly separated laterally on the more apical terga, 6 about straight, with very short, suberect, dark hairs visible in profile, broadly rounded apically in dorsal view, surface very densely and finely punctate, punctures obscured toward apex by rather dense, appressed, pale yellowish tomentum; sternum 6 well covered with dark scopal hairs, becoming rather thin toward the apical fringe of very short dark bristles; scopa yellowish-white, the more basal sterna very closely and finely punctate, punctures becoming more coarse, deep and distinct on the more apical sterna, apical margins narrowly depressed and hyaline; sternal fasciae not evident.

MALE—Length 15 mm.; black, tegulae more brownish-testaceous, legs black, spurs yellow; eyes very slightly convergent below; apical margin of clypeus with a rather narrow, median, slightly incurved area, with a minute, median tubercle; mandibles 3-dentate or sometimes obscurely 4-dentate (fig. 47), with a rather narrow and acute, sub-basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli much nearer eyes than to margin of vertex; cheeks subequal to eyes in width, not angulate below, but this area obscured by dense, elongate pubescence; vertex shining, punctures deep and distinct, close except at extreme sides where they are well separated, becoming close and fine on cheeks; face below anterior ocellus rather coarsely rugoso-punctate, becoming very finely so laterally and below, beneath dense pubescence; pubescence very dense, yellowish-white around antennae and over face below, snowy white, dense and elongate on cheeks below, becoming quite short and thin above, vertex with very short, erect but rather thin, fuscous pubescence; thorax rather densely white pubescent laterally and posteriorly, but short and fuscous on scutum, with some pale, erect hairs anteriorly and a pair of very obscure lines of tomentum, the scutello-mesothoracic suture narrowly pale tomentose; pubescence of scutellum and axillae relatively pale and elongate; pleura dull, punctures quite densely crowded below, relatively distinct but still close above: lateral faces of propodeum rather smooth but dull, punctures obscure, posterior face somewhat more shining, punctures rather close but minute and rather vague; punctures of scutum rather fine and close, densely crowded in large part, those of scutellum fine and crowded, axillae with rather coarse and distinctly separated punctures; front coxal spines short, not much longer than they are broad at base, narrowly rounded apically, densely long white pubescent posteriorly, front coxae with considerable white pubescence but without patches of ferruginous bristles; mid tibial spurs well developed; front tarsi slender and simple, not at all dilated nor grooved, but with a rather dense, posterior fringe of rather short, snowy-white hairs; mid basitarsi rather short and narrow, with a quite conspicuous posterior fringe of elongate, white hairs; mid tibial spurs well developed; hind basitarsi short and slender, fringed anteriorly; tegulae minutely but quite closely and distinctly punctate; wings subhyaline, faintly infuscated apically, veins more brownish; abdominal terga 2-5 rather deeply grooved across base, basal margins of grooves subcarinate on the more basal terga, but becom-

ing quite sharply carinate on 4-5; terga 1-5 with complete, narrow, dense, apical, yellowish fasciae, apical margins rather deeply depressed laterally, but only obscurely so medially on the more basal terga; tergum 1 with elongate, pale yellowish pubescence, this becoming very dense at each extreme side, discal pubescence of the following terga largely dark and very short, but with some pale hairs across base of 2 and 3; punctures rather uniformly fine and close, becoming somewhat more irregular, distinct and more distant on tergum 5, 6 somewhat shining, punctures rather shallow but distinct and close, carina subtriangular, with a more or less rounded apex, sides relatively straight, with no median emargination, median teeth of apical margin carinate, slightly nearer the short but acute lateral teeth than to each other; tergum 7 almost entirely hidden, not produced medially; sterna 1-4 exposed, punctures quite deep and distinct, well separated and rather coarse except on sternum 1; lateral pubescence plates of sternum 5 poorly defined, setose area broad and expansive, setae rather sparse and minute (fig. 48); sternum 6 with well separated, lateral setose areas, the setae sparse and short, apical lobe very broad, lateral angles acute; gonocoxites narrowed above base, slightly dilated and sinuate above, compressed at tips (fig. 49).

DISTRIBUTION—North Carolina, along the coast to Florida, west to Texas, and north to Nebraska, April (in Florida) to September.

FLOWER RECORDS—*Bidens, Clethra, Erigeron, Phaseolus* and *Rhus.*

Megachile (Xeromegachile) integra Cresson

(Figs. 47-49)

Megachile integra Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 121. ♂.

Megachile strophostylis Robertson, 1904. Canad. Ent. 36, p. 277. ♀.

Megachile strophostylis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Xeromegachile) integra Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 341.

FEMALE—Length 11-13 mm.; black, including tegulae and legs, spurs more yellowish; eyes very slightly convergent below; clypeal margin nearly straight but minutely denticulate; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth (fig. 47); lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining, punctures

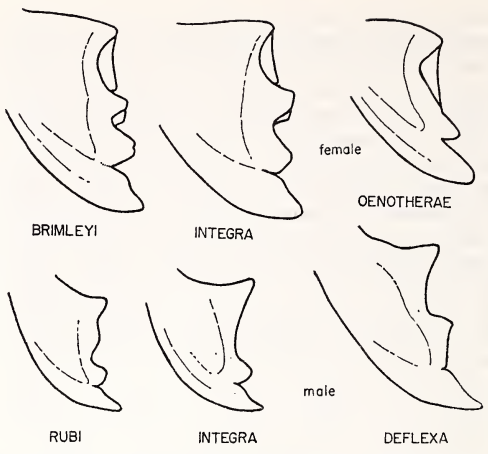


Figure 47—Mandibles in species of *Megachile (Xeromegachile)* and *M. (Megachiloides).*

deep and distinct, quite close but with some shining spaces along mid-line between lateral ocelli, and just above eyes, fine and rather close on cheeks above, becoming somewhat coarser and rather sparse below; face rather coarsely rugoso-punctate below anterior ocellus, but becoming very finely so between antennae and eyes, supraclypeal area with rather irregular but quite deep and distinct punctures, upper margin of clypeus very finely and densely punctate, punctures becoming rather irregular but more widely spaced toward apical margin; pubescence of face and cheeks whitish, rather copious but short around antennae and on face laterally, somewhat elongate on cheeks below but becoming short and thinner above, short, erect, and largely fuscous across vertex and between ocelli; pubescence white or yellowish-white on thorax laterally and posteriorly, very short and erect but copious, fuscous or black on scutum, the anterior margin more or less white, with a pair of oblique, rather distinct lines of pale tomentum, the scutello-mesothoracic suture narrowly white tomentose; scutellum and axillae with largely erect but short, black hairs; punctures of scutum quite deep, distinct, not very coarse but uniformly close throughout, those of scutellum considerably finer and densely crowded except in midline, fine and very close on axillae; pleura somewhat shining, rather coarsely punctate below, punctures slightly separated, becoming finer and considerably closer above; lateral faces of propodeum shining, with numerous, very shallow, obscure and close punctures, posterior face more velvety, punctures minute and vague but rather uniformly close; mid and hind basitarsi shorter, but about as broad as their tibiae; front tarsi relatively slender,

with a rather sparse, posterior fringe of yellowish-white hairs, posterior fringe of mid tarsi relatively short and indistinct; tegulae very minutely and closely punctate; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-piceous; abdominal terga 2-4 shallowly depressed or grooved across base, margins of grooves distinct but not carinate, groove obliterated medially on 4; apical margins of terga 1-5 densely white fasciate, the fasciae rather thin medially, apical margins rather deeply depressed laterally but only obscurely so medially on all; tergum 1 with rather loose but elongate, yellowish-white pubescence, becoming very dense at each extreme side, disc of 2 with considerable short but erect whitish pubescence toward base, narrowly fuscous toward apical margin, 3-5 covered with very short, erect, fuscous pubescence; punctures of terga quite uniformly fine and close, becoming somewhat more deep and distinct on the more apical terga, 6 straight in profile, with just a few suberect hairs visible toward base, broadly rounded in dorsal view, almost completely covered with dense, appressed, greyish-white tomentum; sternum 6 rather uniformly covered with short, dark, scopal hairs, with a rather dense, apical fringe of very short, dark hairs; scopa creamy-white, punctures of the more basal sterna very fine and close, becoming somewhat coarser and more distinct on the more apical sterna, apical margins narrowly hyaline; sternal fasciae not present.

MALE—Length 11-12 mm.; black, tegulae testaceous-hyaline, legs in part yellowish or ferruginous; eyes very slightly convergent below; clypeal margin with a very shallow, median, emarginate area with a minute, median tubercle; mandibles 3-dentate (fig. 47), inferior process almost median in position, broad and only obscurely angulate at tip; apical segment of flagellum quite broadly dilated; lateral ocelli very slighty nearer eyes than to margin of vertex; cheeks subequal to eyes in width, not sharply angulate below; vertex somewhat shining, punctures deep and distinct, rather fine and close, becoming very fine and very close on cheeks; face below level of anterior ocellus quite densely and very finely rugoso-punctate beneath dense pubescence; pubescence of face yellowish, decumbent dorsally above margin of clypeus, with a dense, transverse brush of elongate, yellowish hairs across upper margin of clypeus, hairs below more decumbent, that on cheeks short, entirely white, a thin, transverse fringe of whitish hairs near lower margin, that on vertex yellowish, very short, erect and rather thin; thorax with rather dense but short, yellowish-white pubescence laterally and posteriorly, largely yellowish on scutum and scutellum, that on scutum very short, erect, rather thin, with a pair of narrow, anterior, oblique, lines of whitish tomentum, and scutello-mesothoracic suture with dense, pale tomentum, that on scutellum rather elongate; scutum, scutellum and axillae very finely and closely but quite distinctly punctate throughout; punctures of pleura distinct but fine and very close below, becoming somewhat more distinct just below tegulae; lateral faces of propodeum somewhat shining, obscurely but closely punctate, posterior face more velvety, with very close but minute and vague punctures; front coxal spines very broad at base, abruptly narrowed, apex triangularly acute, densely long white pubescent posteriorly, the coxae entirely bare anteriorly but with a patch of short reddish bristles at base of each spine; mid tibial spurs short but distinct; front tarsi pale yellow, quite broadly dilated, becoming about as broad at apex as the tibiae, rather narrowly excavated anteriorly, with a rather broad, dense, whitish, posterior fringe which is fuscous beneath; front tibiae almost entirely ferruginous, front femora ferruginous except for the somewhat more yellowish, ventral carinate margin; mid and hind femora black, their tibiae more ferruginous, mid basitarsi quite short, narrower than their tibiae, with a very much elongated, quite dense, posterior fringe of pale yellowish hairs, hind basitarsi very short and quite narrow, more or less testaceous; tegulae very minutely and closely punctate; wings subhyaline, becoming faintly clouded apically, veins brownish-piceous; abdominal terga 2-5 somewhat depressed toward base, basal margins subcarinate, these terga with narrow, entire, pale yellowish, apical fasciae which are quite dense laterally, completely so on the more apical terga, margins somewhat depressed laterally on the more basal terga but completely and abruptly depressed on 4 and 5; basal tergum with quite dense, copious, elongate, yellowish pubescence which becomes quite dense at extreme sides, 2 quite largely covered with dense, much shorter, pale yellowish pubescence, 3-5 with very short and rather dense, erect, fuscous or blackish pubescence; tergal punctures rather uniformly very fine and close, becoming somewhat more distinct on tergum 5, 6 very finely and densely punctate, carina broadly and quite regularly rounded or subtriangular, not at all emarginate, median apical teeth broadly carinate, considerably nearer the obscure, lateral angles than to each other; tergum 7 very short, transverse, largely hidden, not at all produced medially; sterna 1-4 exposed, shining, very finely and quite closely punctate, apical margins depressed and narrowly yellowish-hyaline; lateral pubescent plates of sternum 5 rather small, setose area rather expansive,

setae uniformly fine, becoming broadly dilated apically around basal margin, apical margin with a median, dense, bicornate, carinate tuft of hairs (fig. 48); sternum 6 with transverse, well separated setose areas, the setae robust and flexed, apical lobe short, not very broad, but lateral angles produced to slender, tapering points; gonocoxites narrowed above base, dilated, obliquely compressed, slightly sinuate, setose dorsally near apex (fig. 49).

DISTRIBUTION—New Jersey to Kansas, south to Texas and Florida, March (in the south) to September.

FLOWER RECORDS—*Erigeron, Galactia, Glycina, Koellia, Phaseolus* and *Strophostyles.*

Megachile (Xeromegachile) integrella Mitchell

(Figs. 48 & 49)

Megachile integrella Mitchell, 1926. Amer. Ent. Soc. Trans. 52, p. 116. ♀.
Megachile (Xeromegachile) integrella Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 339.

FEMALE — Length 10-12 mm.; black, tegulae more testaceous, legs black, spurs yellow; eyes very slightly convergent below; clypeal margin nearly straight; mandibles 4-dentate, a bevelled edge between 3rd and 4th teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining, punctures quite deep and distinct, rather fine and close medially, becoming slightly more widely separated but still close laterally, close and rather irregular on cheeks; punctures just below anterior ocellus very slightly separated, face otherwise densely and finely rugose, punctures of supraclypeal area distinct but fine and very close, densely crowded across upper margin of clypeus, becoming somewhat more coarse and distinct yet close toward apical margin; pubescence short and white around antennae, on face laterally and on cheeks below, very fine, short and thin elsewhere, vertex with some short, inconspicuous, erect, blackish hairs back of eyes and between ocelli; thorax with short, whitish pubescence laterally and posteriorly, scutum covered in large part with very thin, erect, blackish hairs, these becoming somewhat whitish toward anterior margin, scutellum and axillae with some erect, blackish hairs; scutum rather dull, punctures shallow and somewhat separated medially, becoming fine and very close laterally, slightly separated on scutellum medially, becoming close laterally, very minute and densely crowded on axillae; pleura dull, punctures very close and rather fine, becoming crowded above; lateral faces of propodeum rather smooth but dull, somewhat tessellate, posterior face more velvety, with very close, exceedingly minute and vague punctures; mid and hind basitarsi about as broad as their tibiae, but distinctly shorter; tegulae very minutely and rather closely punctate; wings subhyaline, veins more brownish; abdominal terga 2-5 quite deeply grooved or depressed across base, basal margins of these distinct but hardly carinate, apical margins with entire, whitish fasciae that are very thin medially but dense laterally; margins of terga quite deeply depressed laterally, completely so on 3-5; basal tergum with rather copious, erect, thin, whitish pubescence which becomes very dense at extreme sides, discal pubescence of 2 rather pale but becoming more or less blackish at extreme sides, discal pubescence of 3-5 very short but erect, entirely black, quite distinct at least laterally in dorsal view; tergal punctures minute, somewhat separated at least medially, becoming very close laterally; tergum 6 straight in profile, with a few, suberect, blackish hairs evident, rather broadly rounded, largely covered with rather thin, pale tomentum, punctures very fine and close beneath the tomentum; sternum 6 quite uniformly covered with short, brownish scopal hairs, these becoming somewhat more sparse toward the short, but dense apical fringe; scopa white, possibly with a few black hairs apically on sternum 5; the more basal sterna with very fine, and close punctures, these becoming somewhat more coarse and distinct on the more apical sterna; sternal fasciae not evident.

MALE — Length 10-11 mm.; black, tegulae more brownish-testaceous, front legs yellow and testaceous in part, mid and hind legs black, spurs pale yellow; eyes very slightly convergent below; clypeal margin nearly straight beneath the dense beard; mandibles 3-dentate, inferior process nearly median in position, triangularly acute; apical segment of flagellum slender and elongate; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes, quite strongly narrowed below, without a definite, inferior angle; vertex shining, punctures quite deep and distinct, rather close between ocelli, becoming slightly separated toward margin laterally, close but rather coarse on cheeks above, becoming fine and densely crowded below; punctures below ocelli densely crowded and rather coarse, becoming very fine and densely crowded laterally and below; pubescence whitish, rather dense and copious around antennae and over lower part of face, that on cheeks snowy white, rather elongate and dense below, becoming thin and short above, vertex with rather sparse, elongate, pale hairs and shorter, erect, fuscous hairs, these extending slightly on to upper part of cheeks; thorax with rather short, copi-

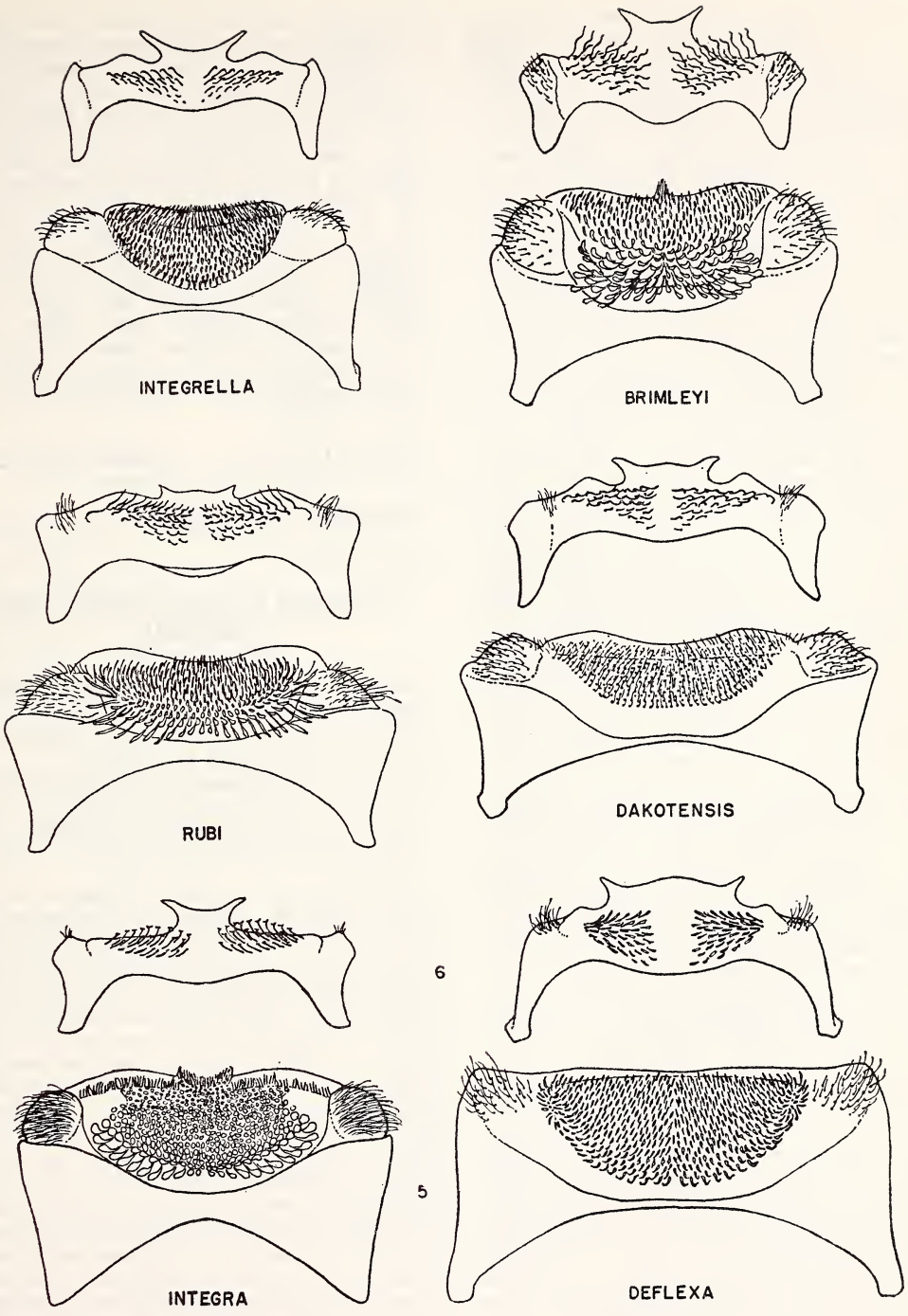


Figure 48
Sterna 5 and 6 in males of *Megachile (Xeromegachile)*.

ous, white pubescence laterally and posteriorly, that on propodeum dorsally more elongate, scutum and scutellum with rather thin but erect, fuscous pubescence, this becoming whitish anteriorly on scutum, scutellum with whitish hairs posteriorly; scutum rather dull, punctures quite deep and distinct, rather coarse, well separated medially, becoming somewhat finer and densely crowded laterally, scutellum somewhat shining between rather evenly spaced, close punctures, and axillae densely and finely punctate; pleura closely and rather coarsely punctate beneath the pubescence, punctures becoming somewhat finer and densely crowded above; lateral faces of propodeum smooth and somewhat shining, with numerous, rather indistinct, very vague punctures, posterior face more velvety, with numerous, very close but minute and obscure punctures; front coxal spines very short but distinct, subtriangular, base nearly as broad as the length, narrowly rounded at tip, anterior surface of coxae quite closely and finely punctate, without a patch of bristles below the spine; front tarsi narrow and simple, pale yellow, with slightly brownish anterior and posterior margins, basitarsi not at all excavated, much narrower than the tibiae, posterior fringe rather thin, whitish, of moderately long hairs; outer face of front tibiae piceous, the other two faces more testaceous; posterior face of front femora piceous except for the more yellowish, lower, carinate rim, anterior face yellowish-testaceous; mid tibial spur well developed; mid tarsi slender and rather short, but with a posterior fringe of very long, whitish hairs; hind basitarsi quite slender; tegulae minutely and closely punctate; wings subhyaline basally, becoming slightly infuscated apically, veins brownish-piceous; abdominal terga 2-5 rather deeply depressed across base, basal margin of depressions only obscurely carinate, apical margins of terga depressed, completely so on 3-5, but widely interrupted on 2, with white apical fasciae, widely interrupted on 2 but entire on 3-5; tergum 1 with rather copious, elongate, white pubescence that becomes quite dense at extreme sides, discal pubescence of 2 and 3 short, quite sparse medially, becoming rather dense toward lateral margins, largely fuscous but white in part on 2; punctures close and rather fine and terga 1 and 2, slightly coarser on 3 and 4, minute and rather sparse on 5 toward base but becoming quite close and coarse toward apical rim, this tergum with considerable pale tomentum toward base; tergum 6 densely and narrowly tomentose across base, finely and closely punctate, carina irregularly rounded, margin rather finely serrate but not emarginate, lateral teeth of apical margin strongly carinate, very much nearer the obscure, lateral angles than to each other; tergum 7 transverse, with a very low, median, apical angle; sterna 1-4 exposed, quite deeply and rather closely and regularly punctate, apical margins rather broadly depressed and hyaline, apical pubescence rather elongate, each sternum being subfasciate; lateral pubescent plates of sternum 5 rather indistinct, setose area rather restricted, separated from sclerotized portions of plate by a membraneous zone, setae quite sparse, minute and simple (fig. 48); sternum 6 with rather elongate, transverse, setose areas that are distinctly separated medially, setae robust, sinuate and spatulate, apical lobe short and rather broad, angles forming elongate, acute lobes; gonocoxites constricted above base, dilated and sinuate apically, with a ventral, subapical, oblique, carinate ridge which is minutely pubescent (fig. 49).

DISTRIBUTION — Coastal North Carolina to Florida, May and June.

FLOWER RECORDS — *Hypericum* and *Oxydendrum*.

Megachile (Xeromegachile) rubi Mitchell

(Figs. 47-49)

Megachile rubi Mitchell, 1924. Elisha Mitchell Sci. Sc. Jour. 40, p. 159. ♀

Megachile neglecta Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 160. ♂.

Megachile (Xeromegachile) rubi Mitchell, 1937. Amer. Ent. Soc. Trans. 62, p. 362.

Megachile (Xeromegachile) rubi Sivik, 1954. Ent. News 65, p. 255. (biology)

FEMALE — Length 11-12 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes subparallel; clypeal margin straight and entire; mandibles 4-dentate, a short bevelled edge between 3rd and 4th teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks somewhat broader than eyes; vertex shining, punctures deep and distinct, rather fine and close between ocelli, slightly coarser and more distinctly separated laterally, rather fine and close on cheeks; face rather coarsely rugoso-punctate just below ocelli, but becoming minutely and closely punctate laterally, supraclypeal area quite coarsely, deeply and closely punctate throughout, clypeus with fine, densely crowded punctures across upper margin, these becoming somewhat coarser and more distinct but still close apically; pubescence white, rather copious and elongate around antennae and on sides of face, rather short on cheeks above, becoming more elongate below, erect and fuscous between ocelli and across vertex; thorax with rather copious, elongate, whitish pubescence laterally and posteriorly, scutum largely covered with erect,

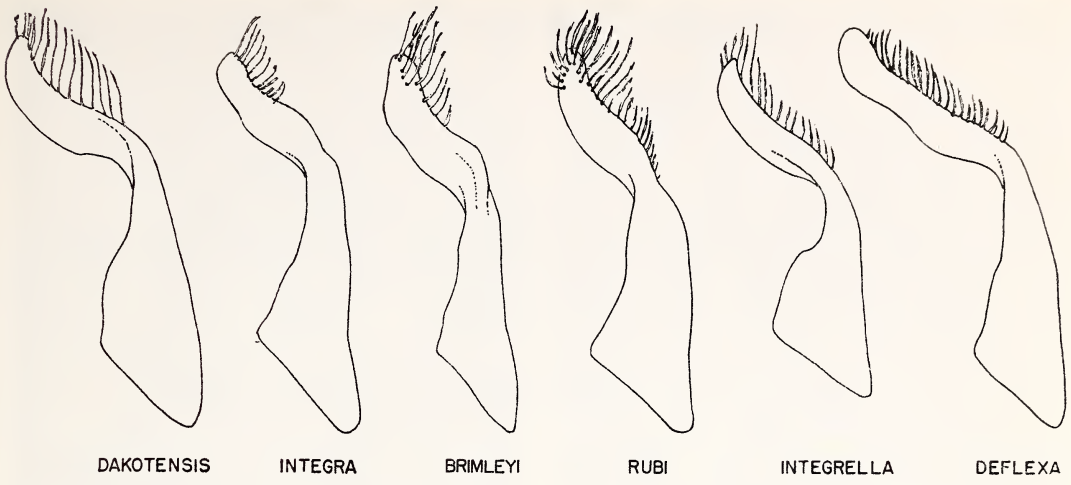


Figure 49—Lateral view of gonocoxites in males of *Megachile (Xeromegachile).*

black hairs, becoming whitish along anterior margin, scutellum with a few rather short, inconspicuous, black hairs interspersed among the more elongate, white hairs; scutum somewhat shining, punctures deep and distinct, quite coarse, somewhat separated medially but becoming densely crowded laterally, scutellum with a rather sparsely punctate and shining median line, punctures deep, distinct and close on each side, those on axillae very fine and densely crowded; pleura dull and rather coarsely punctate below, becoming finer and densely crowded above; lateral faces of propodeum smooth but rather dull, posterior face more velvety, with close but exceedingly minute and vague punctures; mid and hind basitarsi slightly shorter but about as broad as their tibiae, front basitarsi considerably narrower; tegulae shining, punctures very fine but slightly separated; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 shallowly grooved across base, basal margin of grooves distinct but not carinate, apical margins of terga depressed laterally but not medially; terga 2-5 with entire, whitish, apical fasciae, these very narrow on 2 and 3, basal tergum with rather copious, elongate, whitish pubescence, discal pubescence of following terga shorter but copious, entirely fuscous except across base of 2; punctures of terga very fine and slightly separated medially, becoming somewhat closer laterally on the more basal terga, somewhat deeper and more distinct, rather widely separated but not sparse on 3-5; sternum 6 very slightly convex in profile, almost straight, with no erect hairs visible, but with erect dark hairs visible toward base in dorsal view, rather densely covered with pale appressed tomentum apically, this part evenly sloping on each side of an obscure, median ridge; sternum 6 rather well covered with short, black scopal hairs, with a short, apical fringe of very short, fuscous hairs; scopa white, with some black hairs on sternum 5 laterally, the more basal sterna very finely and densely punctate, becoming somewhat more sparsely and coarsely so on the more apical sterna, apical margins narrowly hyaline; sternal fasciae not evident.

MALE — Length 10-11 mm.; black, tegulae somewhat more brownish-testaceous, front tarsi yellow, mid and hind legs black, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight and entire beneath dense pubescence; mandibles 3-dentate (fig. 47), inferior process somewhat removed from base, rather slender and acute; apical segment of flagellum flattened and considerably dilated; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width, narrowed below, obscurely angulate just below base of mandible; vertex shining, punctures deep and distinct, rather close and fine between ocelli but rather widely separated laterally, close and rather coarse on cheeks above, becoming very fine and densely crowded below; face below ocelli with a few scattered, distinct punctures, becoming densely rugose laterally, very finely so below; pubescence yellowish-white, copious and elongate around antennae and over lower part of face, rather thin and whitish on cheeks above, becoming more elongate below, vertex with elongate and erect, whitish hairs, with a few short, black hairs evident on each side; thorax with rather copious, elongate, whitish pubescence laterally and posteriorly and over anterior half of scutum, posterior half of scutum with a rather

conspicuous patch of elongate, fuscous hairs, scutellum and axillae with entirely whitish hairs; scutum somewhat shining between coarse and very close punctures medially, becoming dull, with densely crowded punctures elsewhere, punctures slightly separated on scutellum medially but becoming close and rather coarse laterally, very fine and densely crowded on axillae, pleura rather dull, punctures very close throughout; lateral faces of propodeum smooth but rather dull, posterior face somewhat velvety, with exceedingly minute, close and rather vague punctures; front tarsi and apex of front tibiae yellow, the basitarsus somewhat excavated anteriorly, but slightly narrower than the tibiae, posterior fringe white, quite dense and rather elongate; front tibia fuscous on outer face except at base, the other two faces more reddish-testaceous; posterior face of front femora piceous, the carinate lower rim yellow, upper and anterior faces more testaceous; front coxal spines well developed but rather short and narrow, narrowly rounded at apex, anterior surface of coxae somewhat shining and minutely punctate, but with an obscure patch of very short, pale bristles at base of spine; mid tibial spur well developed, mid basitarsi short and rather slender, with a posterior fringe of very much elongated, white hairs; hind basitarsi quite short and narrow; tegulae very minutely and rather closely punctate; wings subhyaline, faintly clouded apically, veins brownish to piceous; abdominal terga 2 and 3 rather deeply depressed across base, basal margins distinct but not carinate, 4 and 5 very slightly depressed, but basal margin quite distinct, apical margins of the more basal terga slightly depressed laterally, depressed across entire width on 4 and 5, terga densely white fasciate apically, rather thinly so medially on 2 and 3, basal tergum with copious, elongate, whitish pubescence, 2 with shorter, largely white pubescence, 3-5 with erect but rather short blackish pubescence, 5 with some pale tomentum across the base; punctures minute and obscure on basal tergum, fine but quite distinct and slightly separated on the following terga, 6 pale tomentose toward base, punctures fine, rather close medially but becoming somewhat more sparse laterally, carina subtriangular in outline, sometimes obscurely crenulate on each side, but entire medially, the tip narrowly rounded or subacute, median teeth of apical margin broadly carinate, considerably nearer the obscure, lateral angles than to each other; sternum 7 produced medially to an acute, spine-like process; sterna 1-4 exposed, very finely punctate, punctures rather sparse toward apical margin of each plate, closer basally, apical margins narrowly yellowish-hyaline, thinly long pubescent; lateral pubescent plates of sternum 5 rather poorly defined, setose area broad but not entirely filling median length of plate, setae fine, uniformly distributed, but those along basal margin long and dilated apically (fig. 48); sternum 6 with quite extensive setose areas, only slightly separated medially, setae sinuate, apical lobe broad and very short, lateral angles acute; gonocoxites narrowed above base, apical half dilated and slightly sinuate (fig. 49).

DISTRIBUTION — North Carolina to Florida, March to June.

FLOWER RECORDS — *Crataegus, Cuscuta, Ilex, Rubus* and *Senecio.*

Table 5—Distribution of species of *Megachile (Megachile, Litomegachile, Eutricharaea, Delomegachile, Megachiloides* and *Xeromegachile)* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Megachile (Litomegachile)	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
brevis	X			X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X		X	X
b. pseudobrevis																						X		X		X	X
mendica	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
texana		X	X	X	X	X		X	X	X	X		X	X	X				X	X	X	X		X	X	X	X
(Megachile)																											
centuncularis	X	X	X	X		X	X	X	X	X	X		X	X	X	X			X	X							
inermis	X	X	X	X			X	X					X		X							X				X	
montivaga	X	X	X	X		X		X	X	X			X	X	X	X			X			X					
nivalis	X																										
relativa	X	X	X	X		X	X	X	X				X	X	X	X					X	X				X	
(Eutricharaea)																											
apicalis														X					X								
concinna											X				X					X	X	X			X	X	X
rotundata				X					X	X									X	X							
(Delomegachile)																											
addenda		X		X				X	X		X		X	X	X				X			X				X	X
frigida	X	X	X	X		X	X	X					X		X												
f. appalachensis													X									X				X	
gemula	X	X	X	X		X	X	X	X	X	X		X	X	X			X		X	X	X				X	
g. fulvogemula																						X					
ingenua									X	X					X							X				X	X
melanophoea	X	X		X		X	X	X					X		X											X	
m. submelanophoe	X							X																			
mucida																					X	X				X	
(Megachiloides)																											
oenotherae														X								X				X	
(Xeromegachile)																											
brimleyi																						X				X	X
dakotensis									X																		
deflexa																						X				X	X
integra									X	X				X		X				X		X	X			X	X
integrella																						X					X
rubi																						X				X	X

Megachile (Phaenosarus) fortis Cresson

(Figs. 46, 50 & 51)

Megachile fortis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 262. ♂.
Megachile emoryi Cockerell, 1904. Entomologist 37, p. 7. ♀.
Megachile fortis var. *vestali* Cockerell, 1913. Ann. Mag. Nat. Hist. (8) 11, p. 530. ♂.
Megachile (Phaenosarus) fortis Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 143.

FEMALE—Length 16-18 mm.; entirely black, including tegulae and legs, spurs brownish-testaceous; eyes parallel, clypeal margin straight, with a few minute irregularities; mandibles 5-dentate as shown, (fig. 51); lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex and cheeks very finely and closely punctate throughout, and face below ocelli rather finely and closely punctate, the supraclypeal area more densely rugose, clypeus finely and densely punctate along upper margin, but punctures becoming more coarse, deep and distinct and at least slightly separated toward apical margin; pubescence of head and thorax entirely pale, rather short and quite dense, pale yellowish around antennae and sides of face, more whitish on cheeks below, becoming thin and more yellowish above, that on vertex rather short but erect, quite copious, largely pale yellow; pleura and posterior face of propodeum with quite dense, rather short, pale yellowish pubescence, that on dorsum of thorax somewhat brighter yellow, rather short but copious, partially decumbent on scutum; thorax very dull, uniformly very densely and finely rugosopunctate, propodeum somewhat more shining laterally, posterior face dull, with minute, shallow, close and vague punctures; basitarsi only slightly shorter than their respective tibiae, mid and hind pair nearly as broad as their tibiae, tegulae somewhat shining, but with exceedingly minute and very close punctures; wings subhyaline, very faintly clouded apically, veins piceous; abdominal terga 2 and 3 quite deeply grooved across base, basal margin of groove quite distinctly carinate, 4 shallowly depressed across base but hardly grooved, apical margins of all terga somewhat depressed, yellowish-hyaline, densely fringed with short, yellowish pubescence forming conspicuous, transverse and entire fasciae; discal pubescence of tergum 1 copious, elongate pale yellow, that on 2 somewhat shorter, and very short and less conspicuous on 3-5; punctures very fine and quite densely crowded, uniform on the more basal terga, becoming slightly coarser toward apical margin of 5, this hardly at all depressed across base and without a definite, basal, carina-like margin; tergum 6 nearly straight in profile, with only a very few, short, erect hairs toward the base visible, punctures across base in dorsal view very fine, densely crowded but rather distinct, becoming indistinct apically, apical half covered with yellowish, appressed hairs which obscure the surface; sternum 6 rather uniformly covered with pale, rather short, scopal hairs, apical margin with a rather prominant, thickened margin, beyond which there is a dense fringe of very short, yellowish hairs, scopa otherwise pale yellow; sternal plates closely punctate, sternal fasciae not evident.

MALE—Length 14-15 mm.; black, tegulae somewhat more brownish-piceous, mid and hind legs black, anterior tarsi yellow, and front tibiae and femora in part pale in color; eyes parallel; clypeal margin nearly straight beneath a dense beard; mandibles 3-dentate (fig. 51), inferior process extremely broad, terminating below at an acute angle near base, but separated from apical part by a very broadly rounded emarginate area, lower margin less oblique; apical segment of flagellum very broadly dilated; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks very slightly broader than eyes, obscurely angulate and slightly excavated, below, this area fringed with dense, yellowish, rather short hairs; vertex and cheeks quite uniformly, finely and densely punctate, lower portions of face in large part very finely and closely punctate beneath dense pubescence which completely hides surface; pubescence of face and vertex yellowish, dense below level of antennae, rather elongate on vertex medially, becoming shorter, more inconspicuous laterally, very thin and short on cheeks, becoming somewhat paler and more dense along inferior margin; pubescence of thorax rather dense, not very elongate, pale yellowish on pleura and propodeum, somewhat deeper yellow and rather short and erect but not hiding surface on dorsum of thorax; scutum and scutellum dull, with very fine, densely crowded punctures, those on pleura minute and densely crowded; lateral faces of propodeum somewhat more shining, obscurely punctate, posterior face somewhat less shining, with close but rather vague and indistinct punctures; anterior coxal spines robust, rather acutely pointed apically, broad at base, with a large transverse patch of suberect, ferruginous bristles at base, coxae otherwise largely bare; front tarsi pale yellow, rather broadly dilated, about equal to the tibiae, but anterior margin only very obscurely excavated, posterior fringe dense, about equal in length to breadth of the segments, whitish toward apical segments, more brownish-testaceous at base; outer face of front tibiae piceous, with tip yellowish, other two faces more

ferruginous, and posterior face of front femora piceous, with lower margin carinate and testaceous, other faces largely testaceous, densely fringed posteriorly with yellowish hairs which are elongate toward base; mid tibial spurs well developed; basitarsi slightly narrower, considerably shorter than their tibiae, with a much elongated, yellowish, posterior fringe, hind femora somewhat swollen, hind basitarsi about half the length of their tibiae; tegulae very minutely and closely punctate, anterior part quite densely pubescent; terga 2 and 3 quite deeply depressed at base, 4 and 5 more shallowly so, basal margin of depressions distinct, more or less carinate, apical margins of terga uniformly, rather deeply depressed, very deeply so on 4 and 5, the discs overhanging the depressed rims, with dense, entire, yellowish, apical fasciae on all, basal tergum with copious, elongate, yellowish pubescence, apical fringe rather obscure, discal pubescence of the following terga erect, conspicuous, entirely pale, but not obscuring the fasciae; tergum 5 more or less bare apically, punctures very fine and close throughout, minute on the more basal terga, becoming somewhat more irregular and substriate on 5 apically, 6 rather densely tomentose, very closely and finely punctate beneath the pubescence, with a slight median ridge, and slightly depressed on each side, the carina slightly downcurved and truncate, with no median emargination, median apical teeth broadly carinate, much nearer the very small lateral angles than to each other; tergum 7 obscurely angulate medially; sterna 1-4 exposed, very finely, uniformly and closely punctate, apical margins depressed, yellowish-hyaline, quite densely fasciate, the fasciate fringes much broader laterally, sternum 4 not conspicuously fringed but with a quite distinct, median, carinate and acute tubercle; sternum 5 with lateral, apical pubescent plates distinct from the lateral and basal sclerotized areas and the median setose area, this broad apically, narrowed basally, separated from basal margin of plate by a membraneous area, setae robust, abruptly dilated at tips (fig. 46); sternum 6 with broad, more or less oblique setose areas that are well separated medially, lateral portions of plate long pubescent, apical lobe short, but lateral angles produced into long, slender projections; gonocoxites robust, narrowed above base, slightly sinuate, flexed ventrally near apex which is dilated, compressed, bearing long conspicuous setae (fig. 50).

DISTRIBUTION—South Dakota to New Mexico, east to Texas and Illinois, July and August. The occurrence of *fortis* in Illinois was shown by the collection of two specimens on August 20, 1957, a male at Bishopville, Mason Co., and a female at Mason State Forest, on *Helianthus* (Mitchell).

FLOWER RECORDS — *Dicrophyllum, Helianthus, Silphium, Solidago* and *Vernonia.*

Megachile (Xanthosarus) latimanus Say

(Figs. 42, 46, 50 & 51)

Megachile latimanus Say, 1823. West. Quart. Rptr. 2, p. 81. ♂.

Megachile femorata Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 188. ♂.

Megachile acuta Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 192. ♀.

Megachile vidua Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 192. ♀.

Xanthosarus latimanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Xanthosarus) latimanus Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 130.

Megachile (Xanthosarus) latimanus Krombein, 1958. Hymenoptera of America North of Mexico. Synoptic Catalog. U.S.D.A. Agri. Monog. No. 2. First Suppl., p. 245. (synonymy)

FEMALE—Length 13-14 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes parallel; clypeal margin straight, minutely and rather sparsely denticulate; mandibles 5-dentate (fig. 51); lateral ocelli slightly nearer margin of vertex than to eyes; cheeks slightly broader than eyes; punctures of vertex deep and distinct, rather fine, close medially, becoming very slightly separated laterally, minute, close and obscure on cheeks; face below ocelli densely rugoso-punctate, becoming somewhat smoother or very minutely rugose laterally beneath the pubescence, supraclypeal area shining, with scattered, rather fine but deep and distinct punctures, clypeus with rather deep, distinct and fine, closely crowded punctures throughout; pubescence around antennae and on face below pale yellowish, quite copious but not very long, somewhat longer and thinner, entirely yellowish on cheeks below, becoming shorter above, entirely yellowish, quite dense and copious on thorax laterally and posteriorly, vertex and scutum with considerable, somewhat shorter but erect and conspicuous, black pubescence; scutum and scutellum very finely, closely and quite deeply punctate throughout; pleura rather dull beneath the pubescence, very finely and densely punctate, propodeum somewhat more shining and smooth, posterior face with minute, rather close, vague punctures; mid and hind basitarsi nearly as broad as their tibiae, hind basitarsi nearly equal to their tibiae in length;

tegulae rather dull, minutely and very closely punctate; wings subhyaline, faintly clouded apically, veins brownish-testaceous; abdominal terga 2-4 shallowly depressed across base, basal margin of depressions distinct but hardly carinate, apical margins of terga rather narrowly depressed, yellowish fasciate; discal pubescence of terga 1 and 2 long, erect and quite copious, entirely pale yellowish, short and yellowish toward base, black apically on 3 and 4, and black over most of 5, punctures of terga very minute but rather close, becoming very close at extreme sides; tergum 6 very slightly concave in profile, with only a few inconspicuous, suberect hairs visible, the more apical pubescence yellowish, subappressed and rather dense, punctures very fine and densely crowded throughout; sternum 6 rather well covered with yellowish scopal hairs, but these becoming somewhat sparse apically, with a dense fringe of short hairs apically; scopa otherwise orange in color, the more basal sterna very finely and densely punctate, punctures becoming slightly more widely separated and coarse on the more apical sterna, apical margins very narrowly yellowish-hyaline, sternal fasciae entirely absent.

MALE—Length 12-13 mm.; black, tegulae brownish-testaceous, mid and hind legs black, front legs in large part yellowish or testaceous; eyes very slightly convergent below; clypeal margin very slightly incurved on each side; mandibles 3-dentate, outer margin curved as seen from above (fig. 51), inferior basal process quite narrow and elongate, apex obliquely acute, densely pubescent on inner surface; apical segment of flagellum elongate and slightly dilated, rather strongly flattened; lateral ocelli subequally distant from eyes and margin of vertex; breadth of cheeks nearly twice that of eyes, with a concave, shelf-like tubercle at inferior margin that receives tip of the basal, mandibular projection when closed; vertex very finely and closely punctate medially, punctures becoming somewhat more coarse and distinctly separated laterally, very fine and dense on cheeks; surface below ocelli finely and densely rugose, subantennal areas and clypeus very finely and densely punctate; pubescence pale yellowish, copious and elongate around antennae and lower half of face, thinner and erect on vertex, short and thin on cheeks which have a pair of lines of short white hairs along lower margin; pubescence entirely pale on thorax, more whitish on venter and on pleura below, yellow on propodeum and on pleura above, that on scutum and scutellum dense, elongate and bright yellow; scutum dull, punctures indistinct, very fine and densely crowded through, those on scutellum very minute, close but relatively distinct, pleura somewhat shining beneath the pubescence, punctures very fine, shallow and close throughout, propodeum shining laterally, posterior face rather dull, with minute, indistinct, fine and close punctures; front coxal spines robust, rather slender, subacute apically, anterior face of coxa entirely bare, without patches of setae; front tarsi yellow, basitarsus quite broadly dilated at base, slightly narrowed apically, quite deeply excavated anteriorly, tarsal fringe pale yellow, very dense and elongate; front tibiae largely ferruginous, becoming yellow at tip; posterior face of femur piceous apically, but this segment otherwise largely testaceous, densely fringed posteriorly, outer hairs pale yellowish, inner hairs more orange; mid and hind femora much swollen, mid basitarsus with a much thickened, quadrate process, covering most of lower surface, hind basitarsus about half as long as broad, anterior margin evenly curved; tegulae minutely and very closely punctate; wings subhyaline basally, becoming faintly clouded apically, veins brownish-testaceous; abdominal terga 2-5 rather shallowly depressed across base, basal margin of groove distinct but hardly carinate, apical margins of terga rather abruptly depressed, at least laterally and on the more apical terga medially, margins yellowish-hyaline, fringed with pale hairs that form rather loose, indefinite fasciae; discal pubescence of all terga rather long, erect, entirely pale yellow; punctures of terga very minute and quite close, becoming somewhat more distinct on the more apical terga, 6 very finely and densely punctate, carina definite but rather low, irregularly serrate across median area, emargination very shallow or absent, median teeth of apical margin prominant and acute, considerably nearer the small, barely visible, lateral teeth than to each other; tergum 7 prominant, transverse, rather broadly triangular, apex obtusely angulate; sterna 1-4 exposed, finely and closely punctate, apical margins rather deeply depressed, yellowish-hyaline, more or less fringed with rather elongate, pale yellowish hairs; setose area of sternum 5 broad but quite short, separated from base of plate by a wide membraneous area, setae slender and simple (fig. 46); sternum 6 with expansive, setose areas on each side of mid-line, that project apically much beyond the lateral areas, setae elongate and hair-like, apical lobe short but very broad, lateral angles produced and narrowly rounded; gonocoxites robust, constricted above base, sinuate above, setose dorsally toward the apex, this bilobed, dorsal lobe broad and flat, ventral lobe slender, and curved (figs. 42 & 50).

DISTRIBUTION—Alberta to Nova Scotia, south to Kansas and Georgia, May to October. In the southeast it is limited to

the higher elevations of the Appalachians.

FLOWER RECORDS—*Agastache, Althea, Amorpha, Asclepias, Aster, Baptisia, Campanula, Carduus, Cephalanthus, Chamaemerion, Chrysopsis, Cirsium, Cleome, Convolvulus, Eupatorium, Gaillardia, Grindelia, Helianthus, Hieraceum, Kuhnistera, Liatris, Medicago, Melilotus, Mentzelia, Monarda, Pentstemon, Petalostemum, Physostegia, Potentilla, Psoralea, Rudbeckia, Sanchus, Solidago, Stachys, Taraxacum, Teucrium, Traumeria, Trifolium, Verbena* and *Vicia*. The following additional genera are recorded by Robertson (1929): *Abutilon, Arabis, Bidens, Blephilia, Boltonia, Cassia, Coreopsis, Gerardia, Helenium, Hydrophyllum, Lactuca, Lepachys, Lespedeza, Polymonium, Pycnanthemum, Rosa, Ruellia, Strophostyles, Verbesina* and *Vernonia*.

Megachile (Xanthosarus) perihirta Cockerell

Megachile perihirta Cockerell, 1898. Ann. Mag. Nat. Hist. (7) 1, p. 126. ♂.

Megachile latimanus grindeliarum Cockerell, 1904. Ent. News 15, p. 33. ♀.

Megachile (Xanthosarus) perihirta Mitchell, 1936. Amer. Ent. Soc. Trans. 62, p. 136.

This western species is very closely related to *latimanus*, and the females of the two are so much alike as to be practically indistinguishable. The males, however, are easy to recognize, the mid basitarsal protuberance being markedly different from that of *latimanus*. It is much smaller and is narrow and keel-shaped, contrasting with the broad, blunt and robust protuberance in *latimanus*.

Any records of this species east of the Mississippi based on determinations of the female should be viewed with suspicion, and only if males are available should such records be regarded as authentic.

DISTRIBUTION—This species ranges from British Columbia to Mexico, east to Nebraska and Texas, May to October. One collection record in Michigan (1 ♂, Manistigue, Schoolcraft Co., July 1, 1922, S. Moore) indicates its rare occurrence east of the Mississippi.

FLOWER RECORDS—*Aster, Cirsium, Cleome, Epilobium, Eriogonum, Helianthus, Melilotus* and *Trifolium*.

Megachile (Argyropile) parallela parallela Smith

(Figs. 50-52 & 55)

Megachile parallela Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 191. ♂.

Megachile sexdentata Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 125. ♂.

Megachile parallela Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.

Megachile 6-dentata Robertson, 1929. Flowers and Insects Lancaster, Pa., Science Press. (flower records)

Megachile (Argyropile) parallela Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 48.

Megachile (Argyropile) parallela Fisher, 1951. Kans. Ent. Soc. Jour. 24, p. 49. (biology)

FEMALE — Length 13-14 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight, with a rather narrow, slightly produced, median area which is shining and impunctate, and bears a very small but distinct, median tubercle; mandibles broad apically, 4-dentate, a long, bevelled edge between the 3rd and 4th teeth and a much shorter one between the 2nd and 3rd (fig. 51); lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures deep and distinct but quite fine and close on vertex and cheeks, face below ocelli rather finely and densely punctate beneath dense pubescence, but punctures of supraclypeal area and clypeus, deep, distinct, quite close, with shining interspaces evident; pubescence white, rather short but dense below level of anterior ocellus, becoming thin on clypeus, dense and white on cheeks, becoming somewhat elongate below, and white and quite dense on thorax laterally and posteriorly, becoming somewhat yellowish just below wing bases, and entirely pale yellow or white on scutellum; vertex, and scutum black pubescent medially and posteriorly; scutum dull, punctures very fine and quite close, almost crowded laterally, but slightly separated in median area, surface tessellate; scutellum and axillae very densely and finely punctate; pleura finely and closely punctate, somewhat more coarsely so below, becoming fine and densely crowded above; propodeum smooth but rather dull, posterior face with rather close, minute and rather vague punctures; front tarsi slender; mid basitarsus quite broad apically, the anterior, apical margin narrowly produced, segments 2 and 3 very narrow at base, dilated apically, with the anterior, apical angle slender and produced; hind basitarsus very broad, about equal to its tibia, and nearly equalling it in length; tegulae somewhat shining but very minutely and closely punctate throughout;

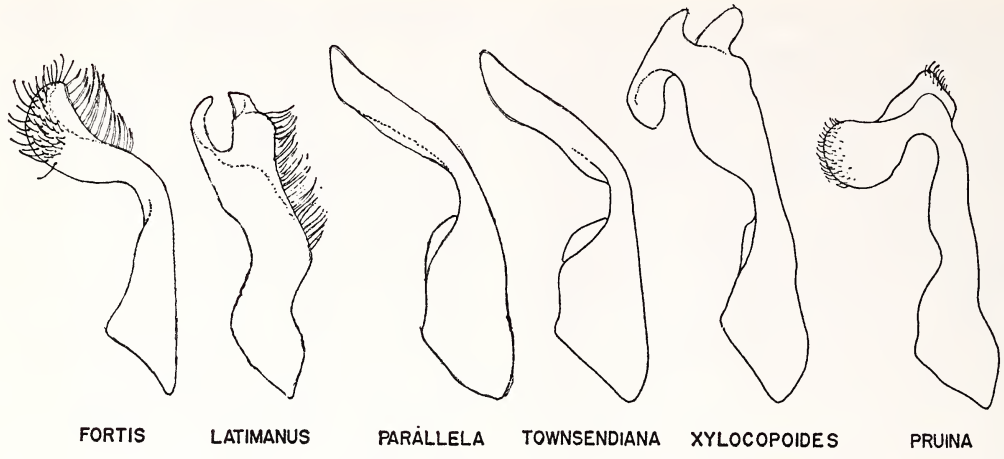


Figure 50—Lateral view of gonocoxites in males of several subgenera of *Megachile*.

wings subhyaline, faintly clouded apically, veins brownish-piceous; abdominal terga 2 and 3 quite distinctly and narrowly grooved across base, basal margin of groove distinct but not carinate; tergum 4 faintly impressed toward base, more conspicuously so on each side, but basal margin not distinct, apical margins of terga 1-5 narrowly depressed, densely pale fasciate, very narrowly so medially on the more basal terga, tergum 1 with copious, elongate, entirely pale yellowish or whitish pubescence, discal pubescence of 2 very short and dense, black laterally, becoming somewhat more elongate and pale at center, that of 3-5 entirely black, very short, and quite dense; punctures of terga fine and very close throughout, becoming densely crowded laterally on the more basal terga, somewhat deeper and more distinct apically, tergum 6 nearly straight in profile, with only a few short, suberect hairs evident, the apical, somewhat narrowed half densely pale tomentose, surface very finely and densely punctate; sternum 6 narrowly rounded at tip, with short, black, scopal hairs that become rather sparse apically, the apex with a bare, slightly upturned lip projecting slightly beyond the dense fringe of short, dark hairs; scopa white, punctures of sterna beneath the scopa slightly separated and rather fine on the more basal plates, becoming somewhat coarser apically; no sternal fasciae evident.

MALE — Length 12-13 mm.; black, tegulae somewhat more brownish, legs entirely dark; eyes very slightly convergent below; apical margin of clypeus beneath beard with a rather narrow, slightly produced area which bears a rather pronounced, median tubercle, quite similar to the female; mandibles obscurely 4-dentate (fig. 51), inferior process very narrow, quite elongate, sub-basal; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes; punctures quite deep and distinct, but very fine and quite close on vertex and on cheeks anteriorly, becoming somewhat more widely separated along posterior margin; face below ocelli very finely and closely punctate beneath the pubescence; pubescence of head and thorax largely pale, copious and dense below ocelli and on clypeus, creamy white or snowy white, often somewhat more yellowish and less dense on vertex and cheeks, becoming more elongate and white on cheeks below, rather dense and whitish on thorax laterally and posteriorly, the scutum and scutellum with shorter and somewhat thinner, erect but quite copious, yellowish or white hairs; scutum dull, very densely tessellate, punctures minute and obscure; scutellum more definitely punctate, punctures minute and densely crowded; pleura with fine, close punctures below becoming densely crowded above; lateral faces of propodeum somewhat shining, minutely punctate, posterior face with somewhat closer and more definite but very minute punctures; front coxal spines rather small, slender, acute, densely long pubescent posteriorly, and to a considerable degree obscured by pubescence on anterior face of coxae; basitarsi of all legs quite slender and simple, anterior tarsi elongate and slender, with a rather short but dense, posterior, white fringe; mid tibial spurs rather short but well developed; tegulae minutely and very closely punctate; wings subhyaline, faintly clouded apically, veins brownish-testaceous; terga 2-5 depressed across base, basal margins distinct but not definitely carinate, apical margins of terga rather deeply depressed at least lateral-

ly, more deeply and completely on the more apical terga, densely pale fasciate, discal pubescence of terga 1 and 2 copious, long and erect, entirely yellowish or whitish, very short but erect and thin on 3-5, 4 and 5 with transverse, basal, tomentose fasciae, quite broad on 5; punctures minute and densely crowded on terga 1 and 2, becoming somewhat more distinct and coarse but still close on the following terga, slightly separated only toward apical margin of 5; tergum 6 densely tomentose across base, obscuring the surface, but evidently very minutely and closely punctate, carina rounded, margins faintly crenulate, with a rather deep semicircular, median emargination, slightly impressed medially just before the emargination, median teeth of apical margin erect, conspicuous, rather narrowly carinate, tips subtruncate, much closer to the more acute, lateral teeth than to each other; tergum 7 narrowly produced medially, tip very slightly incised; sterna 1-4 exposed, shining, very finely and closely punctate except on the more apical plates, apical margins rather narrowly yellowish-hyaline, fringed with long, pale hairs forming a rather thin apical fringe; setose area of sternum 5 indefinite, sparsely covered with fine setae (fig. 52); sternum 6 with lateral, slightly separated, sparsely setose areas, the setae flexed and dilated apically, apical lobe broad, truncate, not at all angulate; gonocoxites narrowed above base, slender, slightly sinuate and not setose (figs. 50 & 55).

DISTRIBUTION — British Columbia to Mexico, east to North Dakota, Indiana, North Carolina and Florida, June to September.

FLOWER RECORDS — *Ceanothus, Encelia, Gaillardia, Gilia, Helianthus, Heterotheca, Hypericum, Medicago, Melilotus, Phaseolus* and *Verbena.* Robertson (1929) records this species (as *sexdentata*) also on *Boltonia, Cephalanthus, Cirsium, Coreopsis, Heliopsis, Lepachys, Petalostemum, Rudbeckia, Silphium* and *Verbesina.*

The occurrence of one or more additional forms of *parallela* in the West makes the subspecific designation of this typical form desirable.

Megachile (Argyropile) townsendiana Cockerell

(Figs. 50-52)

Megachile townsendiana Cockerell, 1898. Ann. Mag. Nat. Hist. (7) 1, p. 129. ♂.

Megachile bishoppi Cockerell, 1915. Ann. Mag. Nat. Hist. (8) 15, p. 535. ♂.

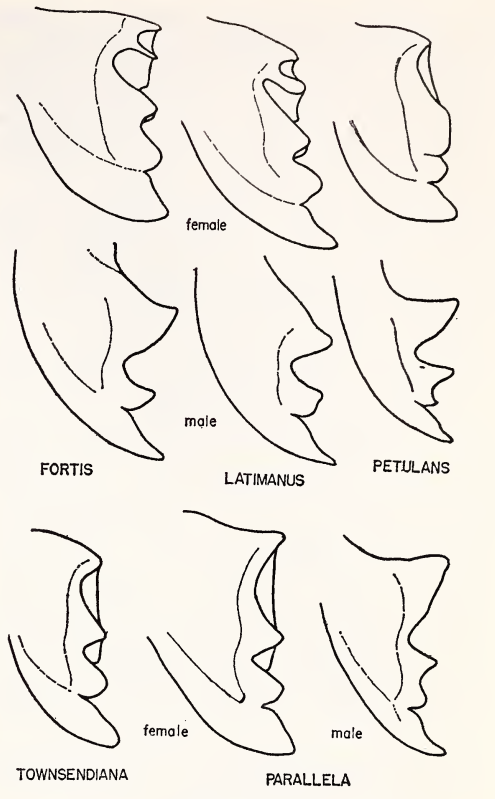


Figure 51
Mandibles in species of *Megachile (Argyropile), M. (Phaenosarus), M. (Xanthosarus)* and *M. (Leptorachis).*

Megachile (Argyropile) townsendiana Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 54.

FEMALE — Length 12 mm.; black including legs, tegulae yellowish-testaceous, spurs yellow; eyes subparallel; clypeal margin nearly straight, the narrow, median area very slightly produced, very narrowly shining and impunctate, with a minute, median tubercle; mandibles quite broad apically, 4-dentate, a long bevelled edge between 3rd and 4th teeth and a very short one between 2nd and 3rd (fig. 51); lateral ocelli slightly nearer margin of vertex than to eyes; cheeks slightly narrower than eyes; punctures of vertex and cheeks above deep and distinct, rather fine and close, becoming more shallow and obscure on cheeks below; face below ocelli quite densely rugose beneath dense pubescence, supraclypeal area more distinctly but densely punctate; clypeus shining between rather coarse and very close punctures, these becoming somewhat finer toward apical margins; pubescence of face white, rather short but copious and dense around antennae and on sides of face, some-

what thinner on cheeks above but becoming more elongate and dense below, short, thin and somewhat more yellowish or dark on vertex; pubescence of thorax dense and white but rather short laterally and posteriorly, more elongate around wing bases, quite conspicuous across anterior margin of scutum, very short and inconspicuous, hardly evident, over posterior half, a pair of oblique, whitish, tomentose lines anteriorly, and scutello-mesothoracic suture densely white tomentose; scutum densely, tessellate, punctures rather shallow but distinct, slightly separated medially, but close laterally, scutelum somewhat more coarsely, and distinctly but very closely punctate, axillae minutely and densely punctate; punctures of pleura rather coarse and deep, close in large part, propodeum somewhat obscured by dense pubescence, posterior face with rather vague, fine and close punctures; front tarsi slender and simple; mid basitarsi broad apically, subequal to its tibia, the anterior, apical angle narrowly produced, segments 2 and 3 very slender at base, broadened apically, and anterior angle markedly produced; hind basitarsi very broad, about equal to their tibiae but somewhat shorter; tegulae minutely and very closely punctate; wings subhyaline, veins piceous; terga 2-4 narrowly grooved across base, basal margins of the grooves distinct but not carinate, apical margins of 1-5 with complete, dense, pale, apical fasciae, tergum 1 with abundant, erect, whitish pubescence, very copious at sides, discal pubescence of the following terga very short and inconspicuous, hardly visible, apparently pale in large part; punctures very fine and close on the more basal terga, becoming somewhat more distinctly but not widely separated on 4 and 5; tergum 6 quite broadly rounded apically, very slightly concave in profile, with no erect pubescence at all visible, largely covered with very fine, appressed tomentum which does not quite hide surface, very minutely and closely punctate, erect hairs evident only at extreme sides; sternum 6 rather well covered with short scopal hairs, with a sub-apical, dense fringe beyond which a bare marginal lip is somewhat flexed upward; scopa entirely white; sternal plates very closely and quite deeply punctate; no sternal fasciae in evidence.

MALE — Length 10 mm.; black, tegulae testaceous-hyaline, legs largely dark, spurs yellow; eyes slightly convergent below; clypeal margin beneath beard very slightly produced medially, this area very slightly incurved, with a minute, median denticle; mandibles obscurely 4-dentate, with a sub-basal, narrowly acute, inferior process; apical segment of flagellum quite narrow and elongate; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures of vertex quite deep and distinct, rather fine and close, becoming somewhat more minute and inconspicuous on cheeks; face below ocelli very finely and closely punctate or subrugose beneath dense pubescence; head and thorax with entirely white pubescence, quite copious and elongate around antennae and over lower part of face and on cheeks below, becoming very thin on cheeks above and across vertex, quite copious on thorax laterally and posteriorly, thin and elongate on thorax dorsally; scutum dull and very densely tessellate, punctures minute, close and shallow, hardly evident, scutellum more distinctly but very finely and closely punctate; pleura dull beneath the pubescence, with very fine and close punctures throughout; lateral faces of propodeum somewhat shining, posterior face with minute and rather close and shallow punctures; front coxal spines quite slender and elongate, acute apically, densely pubescent posteriorly, and to a considerable degree obscured by the coxal pubescence; mid tibial spurs slender and well developed; anterior tarsi entirely simple and slender, much elongated, with a very short, posterior, white fringe, front tibiae more or less testaceous, the femora reddish-testaceous on upper and anterior faces, more fuscous posteriorly except along lower margin, rather densely fringed with white pubescence posteriorly; tegulae smooth, punctures hardly evident; wings subhyaline or faintly infuscated, veins brownish-piceous; terga 2-5 shallowly depressed across base, basal margin of the depressions distinct but hardly carinate, apical margins of terga narrowly depressed, more deeply so on the more apical terga, white fasciate, completely so on 3 and 4, fasciate only at sides on the more basal plates; tergum 1 with elongate and rather copious, pale pubescence, discal pubescence of the following terga very thin, sparse and inconspicuous, hardly evident, apparently largely pale, punctures fine and rather close basally, becoming somewhat more widely separated on 3-5; tergum 6 very densely pale tomentose across base, narrowly produced medially, this area representing the carina slightly downcurved apically, with a narrow, median emargination, median teeth of apical margin acute, well developed, considerably nearer the well developed and acute lateral teeth than to each other; tergum 7 partially exposed, rather broad, apical margin subacute; sterna 1-4 exposed rather deeply and closely punctate, apical margins abruptly depressed and yellowish-hyaline, pubescence rather elongate but thin and pale; setose area of sternum 5 poorly defined, setae very sparse, dilated apically (fig. 52); setose areas of sternum 6 rather widely separated, well defined,

setae robust, flattened and dilated apically, apical lobe poorly defined; gonocoxites narrowed above base, compressed apically, considerably shorter than penis valves (fig. 50).

DISTRIBUTION — Lower California to Arizona, Colorado and Texas, eastward to Florida, Georgia and North Carolina, May to October.

FLOWER RECORDS — *Actinella, Chrysopsis, Helianthus* and *Melanthera.*

Megachile (Leptorachis) petulans Cresson
(Figs. 51, 52 & 55)

Megachile petulans Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♂.
Megachile mexicana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 127. ♀ ♂.
Megachile petulans Robertson, 1929 Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Leptorachis) petulans Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 59.

FEMALE—Length 11-12 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin about straight, with a very slight, median, raised tubercle which does not protrude beyond the margin; mandibles broad apically, obscurely 4-dentate, median teeth low and very broadly truncate, a bevelled edge between the median and inner teeth (fig. 51); lateral ocelli considerably nearer margin of vertex than to eyes; cheeks distinctly narrower than eyes, subcarinate posteriorly; punctures of vertex quite deep and distinct, rather coarse, close medially, becoming well separated or almost sparse toward eyes, very minute, close and hardly distinguishable on cheeks above, becoming somewhat more irregular and more widely spaced below; face below ocelli densely rugoso-punctate, very finely so at sides, supraclypeal area and clypeus with a median, impunctate, polished space, becoming closely and rather finely punctate on each side; pubescence whitish, rather short but copious around antennae, sides of face and on cheeks below, intermixed with fuscous between antennae, largely black around ocelli and across vertex; pubescence of thorax rather short, but dense, entirely whitish laterally and posteriorly, scutum and scutellum with short, thin, erect, blackish pubescence, becoming pale anteriorly on scutum, the scutello-mesothoracic suture with some rather obscure, pale tomentum; punctures of scutum fine and densely crowded in large part, slightly separated in center posteriorly, median punctures of scutellum quite distinct but somewhat finer, becoming very fine and densely crowded laterally and on axillae; pleura dull, with fine and close punctures, somewhat coarser below but becoming fine and densely crowded above; propodeum somewhat shining, very minutely and

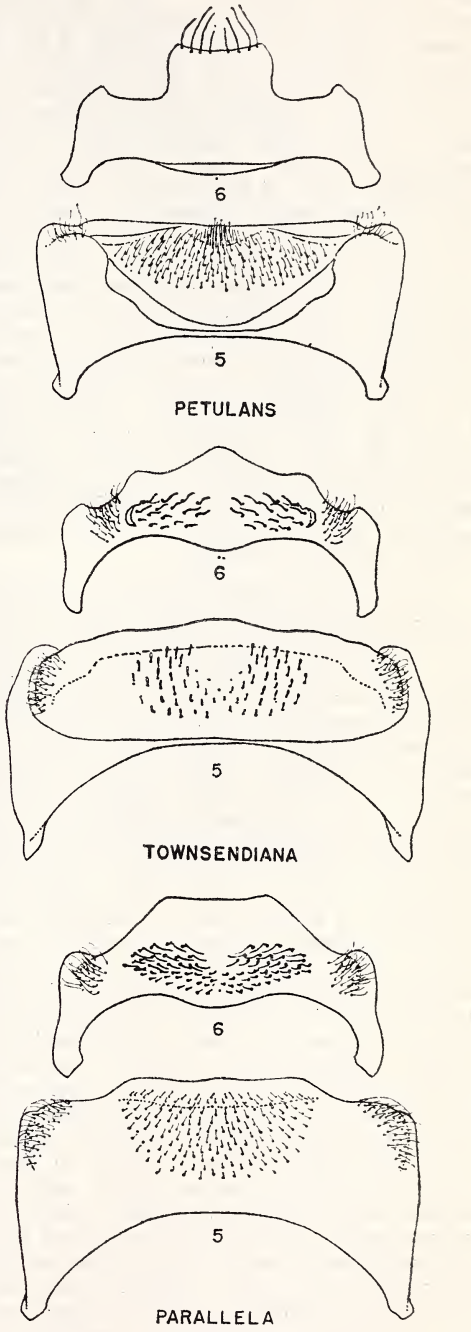


Figure 52
Sterna 5 and 6 in males of *Megachile (Argyropile)* and *M. (Leptorachis).*

obscurely punctate, punctures somewhat closer on posterior face; mid and hind basitarsi about as broad and nearly as long as their tibiae; mid tibial spur rather short but distinct; tegulae shining, with only exceedingly minute, barely visible punctures; wings sub-hyaline, veins brownish-piceous; terga 2-5 slightly depressed toward base, basal margin of the depression distinct but hardly carinate, apical margins of terga hardly depressed but very narrowly and completely whitish fasciate, tergum 1 with rather copious, erect, whitish pubescence which is quite dense at sides, discal pubescence of 2-5 very short but rather dense, entirely black; punctures of terga very fine and close throughout; tergum 6 nearly straight in profile, with abundant, erect, black hairs visible, with some very fine, appressed, pale tomentum partially obscuring surface, punctures very fine and densely crowded throughout; sternum 6 with scopal hairs across basal half but bare apically, apical margin protruding slightly but very inconspicuously beyond the dense, subapical fringe of short, dark hairs; scopa yellowish-white throughout, sternal plates very finely and densely punctate on the more basal sterna, somewhat coarser apically, apical margins yellowish-hyaline; sternal fasciae not evident.

MALE—Length 9-10 mm.; black, legs dark in general but the more apical tarsal segments becoming brownish-testaceous, spurs pale yellow, tegulae brownish-testaceous; eyes rather strongly convergent below; clypeal margin slightly produced medially, this area very shallowly incurved beneath dense pubescence; mandibles 3-dentate (fig. 51), with a rather slender and acute, basal, inferior process; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks considerably narrower than eyes, subcarinate posteriorly; punctures of vertex deep and distinct, rather fine and close medially, becoming somewhat more widely separated and slightly coarser laterally, cheeks minutely and closely punctate; surface of face beneath dense pubescence below ocelli very densely and finely rugose, clypeus more distinctly, but rather closely and rather finely punctate; pubescence of face copious and elongate, pale yellow, that on vertex largely fuscous, long and erect but thinner, short and more whitish on cheeks, becoming quite elongate below; venter of thorax more whitish pubescent, pleura and propodeum pale yellowish, scutum and scutellum with erect, rather elongate, fuscous hairs intermixed with some shorter, pale hairs, the scutello-mesothoracic suture rather densely pale tomentose; scutum rather coarsely punctate, punctures slightly separated in center, becoming very close laterally and posteriorly, those on scutellum somewhat finer, very close throughout, densely crowded on axillae; pleura closely punctate throughout, punctures somewhat more distinct and coarse below, becoming densely crowded above, propodeum somewhat shining but minutely and quite closely punctate, posterior face with more sparse, minute punctures; front coxal spines well developed, rather narrow and narrowly rounded at tip, somewhat spatulate, densely pubescent posteriorly, and coxae with thin, sparse, elongate pubescence anteriorly, without any red bristles; anterior tarsi entirely slender and simple, the more apical segments testaceous, posterior fringe very short and inconspicuous; mid tibial spur very short but distinct; tegulae minutely and quite closely punctate; wings subhyaline, veins more brownish-testaceous; abdominal terga 2-4 rather deeply depressed across base, basal margin of depression quite definitely carinate, apical margins of terga somewhat depressed laterally, that on 4 depressed across entire plate, quite deeply so laterally; punctures very fine and close on the more basal terga, becoming more coarse and distinct apically, 2 and 3 very thinly white fasciate medially, becoming dense laterally, 1 and 2 with rather copious, elongate, whitish pubescence, discal pubescence of following terga becoming blackish toward apical rims, pale at base, 4 with a rather narrow but distinct, transverse, basal fascia, apical fascia broadly interrupted medially; tergum 5 with a faint, median ridge, broadly pale tomentose over most of disc, apical margin very abruptly and deeply depressed but not fasciate, disc with some erect, black hairs apically; tergum 6 densely whitish tomentose throughout, entirely hiding surface, punctures very fine and densely crowded beneath, carina rather low, somewhat produced on each side of a rounded, median, emargination, median apical teeth very low, hardly recognizable, lateral teeth very low but quite distinct; tergum 7 very short, largely hidden; sterna 1-4 exposed, quite closely and deeply punctate, apical margins yellowish-hyaline, those of 2 and 3 very abruptly and deeply depressed, margin of disc before the rim considerably elevated, conspicuously fringed with elongate, pale hairs, hyaline rim of 4 not depressed, very broad, shallowly emarginate medially; setose area of sternum 5 very broad, rather short, setae fine, unmodified (fig. 52); sternum 6 without setose areas, being largely bare, apical lobe broad and short, subtruncate, lateral angles rounded; gonocoxities obliquely compressed medially, abruptly flexed laterally toward apex, with an inner subapical protuberance, setose on inner side apically (fig. 55).

DISTRIBUTION — North Dakota to Mexico, east to New Jersey and Florida,

May to September except in Florida where it is in flight through most of the year.

FLOWER RECORDS — *Apocynum, Asclepias, Aster, Bidens, Chamaecrista, Flaveria, Galactia, Helenium, Helianthus, Hydrolea, Hypericum, Hyptis, Ilex, Koellia, Lespedeza, Liatris, Melilotus, Phaseolus, Polygonum, Rhodendron, Rhus, Rubus, Solidago, Tephrosia, Trifolium, Vernonia* and *Vicia*. Robertson (1929) records this species also on *Achillea, Blephilia, Brauneria, Campanula, Cassia, Cephalanthus, Cicuta, Coreopsis, Desmodium, Eryngium, Lobelia, Ludvigia, Lycopus, Lythrum, Nepeta, Pastinaca, Psoralea, Rudbeckia, Silphium, Strophostyles, Verbena* and *Verbesina*.

Megachile (Acentron) albitarsis Cresson

(Figs. 53-55)

Megachile albitarsis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 263. ♂.
Megachile optiva Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 268. ♀.
Megachile newelli Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 1, p. 262. ♀.
Megachile kallstraemiae Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 1, p. 264. ♀.
Megachile (Acentron) albitarsis Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 75.
Megachile (Acentron) albitarsis Michener, 1947. Amer. Midland Nat. 38, p. 450. (flower records)

FEMALE—Length 12-13 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes subparallel; clypeal margin medially with three small but distinct tubercles; mandibles broad apically, obscurely 4-dentate, the two median teeth broadly truncate, a bevelled edge between these and the inner tooth (fig. 53); lateral ocelli slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width; punctures of vertex deep and distinct but rather fine, slightly more sparse and coarse medially and between lateral ocelli, somewhat finer and much closer on each side, more shallow and obscure on cheeks, becoming quite sparse below; face below ocelli quite densely rugose, clypeus and supraclypeal area with some evident but narrow, shining spaces medially, punctures becoming close on each side; pubescence white, rather short but quite copious below ocelli, around antennae, on cheeks and on clypeus laterally, becoming rather elongate on cheeks below, thin and short above, clypeus with more elongate and erect but thin yellowish pubescence, that between ocelli and across vertex short and black; pubescence of thorax entirely pale laterally and posteriorly, rather short but quite dense on pleura, with dense white tufts back of tubercles and just behind wing bases, scutum and scutellum with short, erect, generally black pubescence, becoming somewhat whitish on scutum anteriorly, with a pair of narrow, slightly oblique, tomentose lines, a dense tomentose spot behind each tegulae, and a line of tomentum in the scutello-mesothoracic suture; scutum, scutellum and axillae finely and densely punctate throughout, with no shining spaces evident, punctures of pleura close, somewhat coarser below, becoming somewhat finer and densely crowded above; propodeum somewhat shining laterally, with vague obscure punctures, posterior face with rather numerous, irregular, minute punctures; hind basitarsi fully as broad and nearly as long as their tibiae; mid basitarsi fully as broad as the tibiae but definitely shorter, the apical, anterior angle somewhat produced, following segments narrow at base, broadly dilated apically, with the anterior angle somewhat prolonged; tegulae minutely and quite closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2 and 3 quite deeply grooved across base, basal margin of the grooves distinct but not carinate, 4 and 5 shallowly depressed toward base but without a definite, basal margin, apical margins of terga rather narrowly depressed, more deeply so on the more apical terga, with quite dense, entire, pale tomentose fasciae; tergum 1 with quite copious, long and erect, whitish pubescence, becoming dense at extreme sides, discs of 2-5 with very short but definitely black pubescence; tergal punctures fine and close throughout; tergum 6 straight in profile, with no erect pubescence evident, but with erect black hairs toward base visible in dorsal view, surface otherwise finely greyish tomentose,

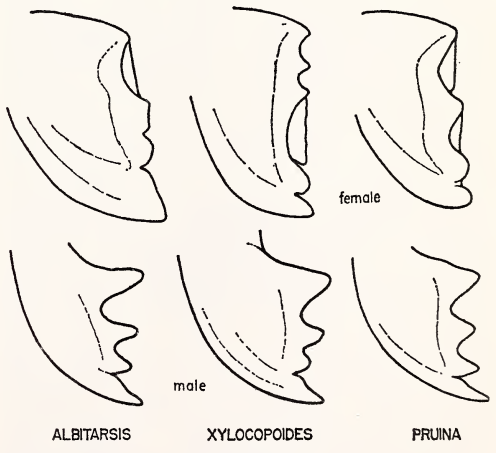


Figure 53
Mandibles in species of *Megachile (Acentron)*. *M. (Pseudocentron)*, and *M. (Melanosarus)*.

punctures extremely minute and densely crowded except at extreme sides toward base; sternum 6 with a row of elongate hairs across the base, but bare from this to the subapical fringe of very short, brownish hairs, a narrow, rounded lip projecting slightly beyond this fringe; scopa white, the sterna closely and rather deeply punctate, close on the more basal sterna, becoming somewhat more widely spaced apically, apical margins of the plates narrowly hyaline; no sternal fasciae evident.

MALE—Length 11-12 mm.; black, tarsi bright yellow, tibiae more testaceous, and tegulae yellowish-hyaline; eyes slightly convergent below; clypeal margin medially with three small but distinct tubercles beneath dense pubescence; mandibles distinctly 4-dentate (fig. 53); inferior process sub-basal, robust, lower margin oblique to an acute, apical angle; apical segment of flagellum flattened and quite broadly dilated; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width, shallowly excavated below, lower margin of the excavation produced to a robust, blunt tubercle, surface of the excavation shining and impunctate, with a dense, transverse line of long whitish pubescence just above; punctures of vertex deep and distinct, but fine and uniformly close, becoming minute and densely crowded on cheeks just back of eyes, but the more posterior punctures becoming shallow, somewhat more coarse and sparse, uniformly minute and densely crowded just above the transverse, pubescent band; face below ocelli beneath the dense pubescence quite uniformly, densely and finely rugoso-punctate; pubescence entirely pale on head and thorax, yellowish, very dense and decumbent on supraclypeal area and just below ocelli, more erect at sides of face and on clypeus, rather short, thin, and much more sparse on vertex, becoming thin and whitish on cheeks and snowy-white beneath; pubescence white on thorax beneath, becoming more yellowish on pleura above, and on propodeum posteriorly, thin, erect and yellowish on scutum and scutellum, scutum with a pair of oblique, anterior spots of yellowish tomentum, a quite dense yellowish tuft back of tegulae, and a band of yellowish tomentum in the scutello-mesothoracic suture; scutum and scutellum densely, finely, rugoso-punctate throughout, punctures of pleura very close and fine above, becoming shallow and vague on the shining and bare venter; propodeum somewhat shining but rather dull, posterior face with numerous, minute and rather vague punctures; anterior basitarsi broadly expanded, especially apically, pale yellow, anterior margin quite deeply excavated, following segments much shorter, posterior fringe pale yellow, the hairs much shorter than total width of the segments, tipped with fuscous beneath, segment 2 with a distinct, fuscous, integumental spot beneath; front tibiae and femora largely testaceous to yellowish; front coxal spines broadly spatulate at base, accuminate apically, surface of the coxa bare and polished, without red bristles; mid basitarsus broadly dilated but rather short, posterior margin semicircular, rather densely covered with yellowish-white hairs, following segments quite short and slender; mid tibiae testaceous, lower margin produced and slightly angulate apically, tibial spur absent; each mid coxa with a short but sharply acute spine; hind basitarsus somewhat narrower and definitely shorter than the tibia, pale yellow, following segments very short and narrow; tegulae minutely and closely punctate; wings subhyaline, veins brownish-testaceous; abdominal terga 2-5 quite strongly depressed across base, basal margin of the depression distinct, obscurely carinate, apical margins of the terga narrowly depressed, more deeply so on the more apical terga, with entire, dense, pale fasciae on 2-4, 4 and 5 pale tomentose across base, broadly so on 5; tergum 1 with copious, erect, yellowish pubescence, discal pubescence of the following terga very short but quite copious, entirely yellowish, 5 with scattered, erect, yellowish hairs, fasciate apically only at extreme sides, the margin very deeply and abruptly depressed; tergum 6 very short dorsally, surface densely whitish-tomentose, obscuring the surface except at extreme base, punctures fine and irregular, mostly quite close, carina very low and inconspicuous, with a barely evident, shallow, median emargination, median and lateral teeth of apical margin very poorly developed; tergum 7 transverse, very short, largely hidden, not at all acute medially; sterna 1-4 exposed, punctures fine, quite close on 2 and 3, very minute and sparse medially on 4, becoming coarser but still rather sparse laterally, apical margins quite deeply depressed, yellowish-hyaline, subfasciate laterally; setose area of sternum 5 broadly rounded, densely covered with fine setae, with a median, apical tuft of 6-8 parallel, robust, spine-like setae (fig. 54); setose areas of sternum 6 triangular, oblique, widely separated, setae short, robust, modified, apical lobe short and narrow, not angulate; gonocoxities slender above base, dilated just before apex, tips elongate and narrow, with a small protuberance on inner side of apex, this area short setose (fig. 55).

DISTRIBUTION—Michigan and Indiana to North Carolina and Florida, west through Texas to Mexico, March to November in the more southern regions, May to September elsewhere.

FLOWER RECORDS — *Asclepias, Bidens, Cassia, Cephalanthus, Chrysopsis, Coreopsis, Eryngium, Flaveria, Gaillardia, Galactia, Helenium, Ilex, Liatris, Melilotus, Phaseolus, Pycnanthemum, Rhus, Rudbeckia, Solidago, Stokesia* and *Verbena.* Michener (1947) records this species on *Aster, Cyrilla, Helianthus* and *Ipomoea.*

Megachile (Pseudocentron) pruina pruina Smith

(Figs. 50 & 53-55)

Megachile pruina Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 190. ♀.

Megachile pinguis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 126. ♂.

Megachile floridana Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 125. ♂.

Megachile pruina Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.

Megachile shermani Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 163. ♂.

Megachile pruina var. *bermudensis* Mitchell, 1929. Psyche 36, p. 92. ♀.

Megachile (Pseudocentron) pruina Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 65.

FEMALE—Length 12-13 mm.; entirely black, including tegulae and legs, spurs pale yellow; eyes very slightly convergent below; clypeal margin straight; mandibles quite broad apically, 4-dentate, with bevelled edges between 2nd, 3rd and 4th teeth (fig. 53); lateral ocelli very slightly near margin of vertex than to eyes; cheeks subequal to eyes in width; vertex somewhat shining, punctures quite deep and distinct, rather coarse along margin, and between and behind ocelli, becoming somewhat finer and more sparse between eyes and ocelli, close on cheeks, becoming almost rugose below; face below anterior ocellus rather coarsely rugoso-punctate, becoming very finely and densely so laterally beneath dense pubescence, supraclypeal area with some shining spaces medially, but densely punctate laterally and above, clypeus with a somewhat more lightly punctured median line, closely and densely punctate on each side; pubescence white, quite dense and elongate around antennae and along inner orbits, rather sparse, suberect and largely pale on clypeus, a few black hairs intermixed with the white between antennae, largely black on vertex, rather short and pale on cheeks above, becoming somewhat more elongate below; thorax white pubescent laterally and posteriorly, scutum and scutellum with rather short but erect, rather conspicuous, black pubescence, scutum narrowly pale pubescent anteriorly, and scutello-mesothoracic suture with a very narrow line of pale tomentum; scutum and scutellum somewhat shining, punctures rather deep and distinct, fine over most of scutum, slightly separated over the broad, median area, slightly more coarse and sparse medially on scutellum, but becoming much closer laterally, axillae with fine and close punctures; pleura rather

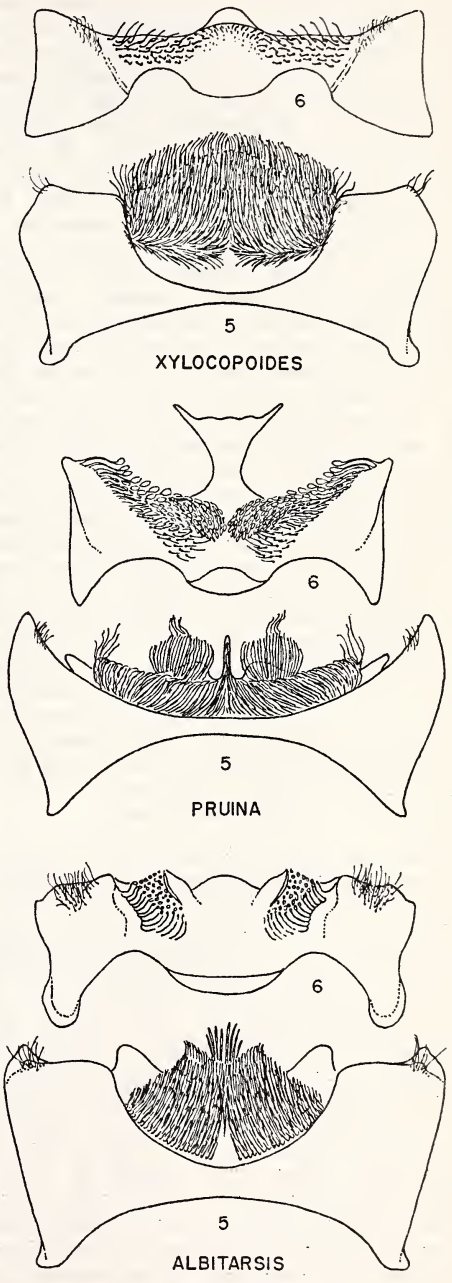


Figure 54
Sterna 5 and 6 in males of *Megachile (Acentron), M. (Pseudocentron),* and *M. (Melanosarus).*

dull, punctures rather coarse and contiguous below, becoming finer and densely crowded above; propodeum rather smooth, only obscurely and shallowly punctate laterally, posterior face with rather close, shallow and minute punctures; basitarsi slightly narrower and considerably shorter than their respective tibiae, mid basitarsus with conspicuous, fuscous pubescence on outer face; tegulae minutely and closely punctate; wings subhyaline, becoming somewhat clouded apically, veins brownish-piceous; abdominal terga 2 and 3 with transverse, complete but rather shallow, sub-basal grooves, basal margins of these grooves distinct but hardly carinate, terga 4 and 5 shallowly depressed toward base, but basal margin indistinct; apical margins of terga narrowly depressed only toward sides, narrowly but quite densely white fasciate; basal tergum with rather copious, elongate, entirely pale pubescence, discal pubescence of following terga more or less erect, short, completely black; punctures of terga rather fine and close, uniformly minute and close on tergum 2, becoming slightly coarser and somewhat more definitely separated apically, tergum 6 straight in profile, with a few suberect, black hairs evident, these becoming erect and more conspicuous at sides in dorsal view, surface largely covered with appressed, pale tomentum which obscures surface, the minute and densely crowded punctures evident only toward sides; sternum 6 largely bare except for a basal fringe of scopal hairs, apical margin slightly produced beyond the subapical fringe of short, dark setae; scopa otherwise white, with a few black hairs at extreme sides of sterna 4 and 5, and across base of 6; sternal plates quite closely, rather finely punctate, apical margins narrowly yellowish-hyaline, sternal fasciae not present.

MALE—Length 11-12 mm.; black, the front legs and mid and hind tarsi in considerable part yellow, tegulae black with brownish and yellowish blotches, tibial spurs yellow; eyes very slightly convergent below; median portion of clypeal margin very slightly produced; mandibles 4-dentate, with a rather dense tuft of short, whitish hairs on outer side as seen from above (fig. 53), inferior process basal in position, subacute apically, lower margin of mandible with a submedian, distinct, apically directed angle; apical segment of flagellum slender and elongate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, lower margin slightly excavated and angulate, rather finely but copiously pale pubescent; vertex shining, punctures quite deep and distinct, rather close and coarse medially, becoming somewhat more fine and sparse laterally, rather close but shallow and obscure on cheeks, becoming very fine and densely crowded below; surface below ocelli and on clypeus rather finely rugosopunctate; pubescence yellowish-white, copious and rather dense on face around and below antennae, thin and whitish on cheeks medially, more yellowish or fuscous, thin and erect on vertex; pubescence rather thin but somewhat copious and elongate on thorax laterally and posteriorly, scutum with largely erect, short, fuscous hairs, these more or less whitish anteriorly, scutellum with a few, erect, fuscous hairs in the generally pale pubescence, the scutellum-mesothoracic suture very obscurely pale tomentose, and a small, white tuft just back of each tegula; scutum and scutellum rather uniformly, closely, deeply and rather finely punctate, punctures somewhat more distinct medially, slightly finer on scutellum medially, but becoming slightly coarser on axillae; pleura rather dull beneath the pubescence, punctures rather coarse but very close, propodeum somewhat more shining, punctures shallow and vague but rather numerous, posterior face somewhat more shining, punctures numerous but minute and rather obscure; front coxal spines long and erect, narrowly spatulate, with rounded tips, coxal surfaces rather smooth and bare anterior to the spine, without red bristles, becoming rather densely white pubescent laterally; front tarsi entirely yellow, basitarsus somewhat excavated anteriorly, gradually dilated to the broad tip, base slightly narrower than its tibia, following segments successively shorter and narrower, posterior fringe rather broad, white tipped with brownish beneath; front tibia piceous except for the narrow, yellowish apex, inner and anterior surfaces more testaceous; apical portion of posterior face of front femora piceous with a broadly impunctate, bright yellow, ventral rim, carinate dorsally, upper surface otherwise bright yellow or testaceous, anterior surface largely testaceous; lower apical angle of mid tibia prolonged to form a spur-like projection, spur entirely lacking; mid and hind tarsi yellow anteriorly, posterior margin narrowly fuscous, mid tarsi with a thin posterior fringe of elongate, pale hairs, hind tarsi with an anterior fringe of elongate hairs; tegulae minutely but very closely and distinctly punctate; wings rather lightly infuscated, veins brownish to piceous; abdominal terga 2-5 shallowly depressed across base, basal margins of these depressions quite distinct, more or less carinate, apical margins of the terga conspicuously depressed laterally; basal tergum with rather copious, erect, elongate, entirely pale pubescence, 2-4 with short, black, erect, discal pubescence, that on 5 blackish toward base but becoming pale toward apical margin; punctures fine and quite close on the more basal terga, becoming somewhat more distinct and more widely separated on 3 and

4, rather coarse and irregular on 5; tergum 6 vertical, surface above carina very finely and densely rugose, with scattered, fine and irregular nodules, the carina rather low but distinct, with a rather narrow, rounded, median emargination, median teeth of apical margin evident only as low carinae which are considerably nearer the very small but acute lateral teeth than to each other; tergum 7 transverse, largely hidden, very slightly angulate medially; sterna 1-4 exposed, punctures very fine and rather close on the more basal segments, becoming somewhat more sparse apically, apical margins rather broadly depressed, abruptly hyaline except on 4; setose area of sternum 5 restricted in area, its apical margin with an abrupt emargination in which is located an elongate, tapering, acute median lobe, a rather elongate, wing-like lobe on each side, setae very fine, those along apical margin elongate, especially on each side where they are curved and abruptly flexed apically (fig. 54); setose area of sternum 6 more restricted in area, forming a somewhat oblique, transverse line, slightly separated medially, the more lateral setae robust, very long and directed medially, apical lobe elongate, very narrow basally, broadened apically, lateral angles narrowly produced and acute; gonocoxites of genital armature gradually narrowed from base to near the tip, bilobate apically, dorsal lobe flexed inwardly, its oblique, apical margin shallowly excavated, ventral lobe extremely robust, more or less rounded, with its ventral surface deeply excavated (figs. 50 and 55).

DISTRIBUTION — North Carolina to Florida and Texas, March to October in Florida, June to September elsewhere.

FLOWER RECORDS—*Asclepias, Crotalaria, Cuscuta, Gaillardia, Helianthus, Ocimum, Rhus* and *Strophostyles*. Graenicher (1930?) records it on *Croton, Dalbergia, Galactia, Melanthera* and *Vernonia*.

The subspecific designation is used here for this typical form of *pruina* because of the occurrence of another form, *nigropinguis* Mitchell in Texas.

Megachile (Melanosarus) bahamensis Mitchell

Megachile bahamensis Mitchell, 1927. Psyche 34, p. 47. ♀.

Megachile (Melanosarus) floridensis Mitchell, 1934. Amer. Ent. Soc. Trans. 59, p. 349. ♂ ♀.

Megachile (Melanosarus) floridensis Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 80.

Megachile (Melanosarus) bahamensis Krombein, 1953. Amer. Mus. Novitates 1633, p. 21. (synonymy)

FEMALE—Length 13 mm.; entirely black, including tegulae and legs, mid and hind spurs brownish; eyes slightly convergent below; clypeal margin nearly straight; mandibles 5-dentate, a long bevelled edge between 2nd and 3rd teeth; lateral ocelli subequally distant from eyes and margin of vertex; cheeks slightly narrower than eyes; vertex shining, with scattered, very sparse, shallow and rather coarse punctures, and a few exceedingly minute, hardly visible punctures between, area between and behind lateral ocelli nearly to margin of vertex impunctate, and area between eyes and ocelli with only exceedingly minute punctures; cheeks above with rather coarse and close punctures, becoming almost rugose below; face below anterior ocellus somewhat shining, punctures rather variable and well separated but quite deep and distinct, becoming more finely rugoso-punctate laterally; supraclypeal area shining, with only a few, scattered, rather coarse punctures, clypeus shining, punctures rather coarse but slightly separated medially, becoming rather close at extreme sides; pubescence over entire head and thorax deep fuscous to black, rather dense around antennae, on sides of face and a transverse brush above anterior ocellus, quite dense and elongate on cheeks below, becoming shorter above; pubescence quite dense on thorax laterally and posteriorly, the scutum and scutellum very sparsely short pubescent; scutum and scutellum shining, punctures fine, quite sparse over the broad median area of scutum, more narrowly so on scutellum, punctures becoming rather close laterally, fine and slightly separated on axillae, those on scutellum of two rather distinct sizes; pleura dull, quite closely and rather finely punctate, lateral faces of propodeum dull, rather shallowly rugoso-punctate, posterior face very finely and closely punctate; all basitarsi subequal in breadth to their tibiae and only slightly shorter; tegulae with minute rather close and barely visible punctures; front wings quite deeply infuscated or brownish, veins brownish-piceous; basal depressions of abdominal terga barely evident, basal margin of 2 and 3 subcarinate, very finely and quite sparsely punctate medially, apical margins depressed only at extreme sides, and area just anterior to these depressions very sparsely punctate and shining, punctures rather close and deep in the depressed margin; basal tergum with rather elongate, copious, fuscous pubescence, discal pubescence of following terga very sparse, suberect, short and entirely fuscous or black; tergum 6 about straight in profile with no erect hairs visible, but with a few erect, black hairs laterally in dorsal view, punctures exceedingly minute and densely crowded throughout, more or less obscured by very short, quite dense, brownish tomen-

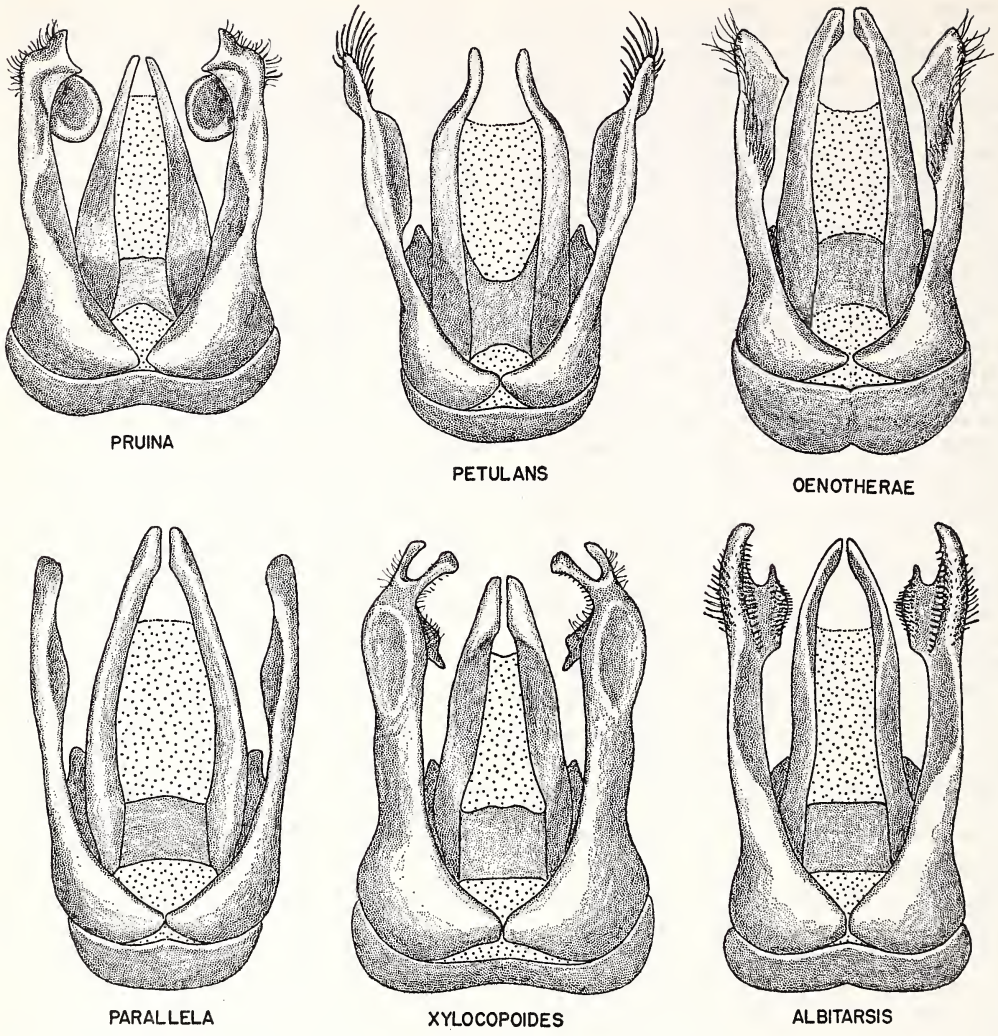


Figure 55—Genital armature in males of 6 subgenera of *Megachile*.

tum; sternum 6 with a sub-basal row of black scopal hairs, otherwise largely bare, with a short, bare, apical rim protruding slightly beyond the transverse subapical fringe of short, dark hairs; scopa entirely black, punctures very close on sterna, becoming somewhat more distinct to sternum 5, apical margins very narrowly yellowish-hyaline, and no sternal fasciae evident.

MALE—Length 11-12 mm.; black, tegulae more brownish-piecous, all tarsi yellowish, front femora and tibiae yellowish or ferruginous in part; eyes slightly convergent below; clypeal margin about straight; mandibles 4-dentate, acute tip of the ventral process submedian in position; apical segment of flagellum somewhat flattened and slightly dilated; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly wider than eyes, much narrowed below, with a shallow, somewhat elongated excavation beneath lower end of eye, which is pale yellowish tomentose, a dense white fringe just above; vertex shining in part, but punctures back of lateral ocelli deep, distinct and very close, with an impunctate area between ocelli, punctures becoming slightly separated on each side of vertex, close and rather fine on cheeks above, becoming minute and densely crowded on cheeks below, lower half of face with fine, densely crowded punctures beneath dense pubescence; pubescence yellowish-white, rather elongate and very copious on lower part of face, short and inconspicuous on cheeks, but with a somewhat dense, posterior fringe; vertex

with short, erect, and rather thin, fuscous pubescence; thorax with rather pale pubescence beneath, becoming more or less fuscous laterally, pale yellowish on propodeum posteriorly, erect, black, short and rather copious on scutum and scutellum, scutum with some pale pubescence anteriorly, and scutello-mesothoracic suture with some fine, pale tomentum; punctures rather deep, distinct, fine and close on scutum, crowded except in center, scutellum with a narrow, median, sparsely punctate line, closely punctured on each side, axillae with fine, slightly separated punctures above; pleura dull, punctures very close, rather coarse below, becoming fine and densely crowded above; lateral faces of propodeum somewhat smoother and only obscurely sculptured, punctures of posterior face very fine and shallow but quite close; front coxal spines rather broad at base, spatulate and narrowly triangular, with narrowly rounded tips, a few very short, pale setae on coxae at base of spine, the coxae quite densely, creamy pubescent on each side; mid tibial spurs absent; front tarsi pale yellow, very broadly expanded or dilated, segments 1 and 2 subequal in length along posterior margin, but 1 very broadly expanded apically, deeply excavated,, overlying anterior margin of 2, this somewhat less broadly expanded apically, posterior fringe rather short but dense, pale yellowish to white, tipped with fuscous beneath; front tibiae piceous to ferruginous on outer face, the other two faces testaceous, apical portion of posterior face of front femora piceous, otherwise yellowish-testaceous, base slightly produced posteriorly; mid tarsi slender and elongate; hind basitarsi relatively short, clothed with dense, yellowish pubescence beneath, this forming rather definite, anterior and posterior fringes; tegulae very minutely and closely punctate; front wings pale fuliginous or brownish, hind wings subhyaline, veins brownish-piceous; terga 2-4 rather deeply, transversely depressed across base, basal margin of depressions only inconspicuously carinate, apical margins of terga 2 and 3 quite abruptly and deeply depressed laterally, this obliterated medially, but abrupt, deep and complete on 4 and 5, fasciae not evident; basal tergum with elongate, rather copious, yellowish pubescence, becoming somewhat intermixed with fuscous at extreme sides, discs of following terga with short but dense and erect, blackish pubescence, punctures fine and close on the more basal terga, becoming somewhat more distinct on 3 and 4, uniformly close and rather fine on 5, 2 with a small, impunctate area on each side adjacent to apical groove; tergum 6 vertical, very finely and densely rugoso-punctate, with a quite deep, median excavation, the carina low, with a rounded, median, apical emargination, the two resulting lobes rather narrowly rounded, apical teeth not evident; tergum 7 largely covered, very narrowly truncate apically; sterna 1-4 exposed, rather closely and deeply punctate toward apical margins of each plate, becoming impunctate basally, apical margins of 2 and 3 very narrowly depressed, yellowish-hyaline, margin of 4 somewhat more broadly depressed and hyaline, more or less membraneous, these sterna with loose, apical fringes of elongate, pale hairs; setose area of sternum 5 rather broadly produced apically, separated from basal part of plate by a broad, membraneous area, but this considerably narrowed toward base, setae very fine and dense; setose area of 6 rather extensive, not appreciably separated medially, the more lateral and apical setae quite elongate, apical lobe rather narrowly produced and rounded, not at all angulate; gonostyli robust, rather abruptly narrowed just above base, conspicuously trilobate at apex. (as in *xylocopoides*, fig. 55)

DISTRIBUTION—Southern Florida and the Bahamas, March to October.

FLOWER RECORD—*Flaveria.*

Megachile (Melanosarus) xylocopoides Smith

(Figs. 50 & 53-55)

Megachile xylocopoides Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 189. ♀ ♂.
Megachile xylocopoides Graenicher, 1930. Ent. Soc. Amer. Ann. 23, p. 162. (flower records)
Megachile (Melanosarus) xylocopoides Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 80.

FEMALE—Length 14-15 mm.; entirely black, including tegulae and legs, mid and hind spurs brownish- testaceous; eyes very slightly convergent below; clypeal margin broadly and very slightly incurved; mandibles 5-dentate, a long bevelled edge between 2nd and 3rd teeth (fig. 53); lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; vertex shining, rather irregularly and sparsely punctate, punctures becoming somewhat coarser toward margin, but with an impunctate area between ocelli, and punctures very minute, sparse and obscure between ocelli and eyes; cheeks becoming quite coarsely and closely punctate posteriorly and below, very finely and closely punctate toward eyes; face below anterior ocellus quite distinctly and deeply punctate, punctures well separated, becoming somewhat finer and densely crowded laterally and along inner margins to clypeus, supraclypeal area shining, with only a few, scattered, rather coarse and deep punctures, clypeus also shining, punctures quite close, deep and irregular, becoming somewhat finer toward the slightly

elevated and impunctate apical margin; pubescence of entire head and thorax black to deep fuscous, rather short, quite dense around antennae, on cheeks below, and quite copious on thorax laterally and posteriorly; scutum and scutellum somewhat shining, punctures rather fine but quite deep and distinct, sparse over most of scutum, becoming rather close anteriorly, and between notaulices and tegulae; scutellum broadly angulate, punctures sparse medially, but becoming quite close laterally, somewhat finer and closer on axillae; pleura densely and rather finely punctate; lateral faces of propodeum finely rugoso-punctate, posterior face smoother and more shining, with fine, obscure, shallow and quite irregular punctures; basitarsi of all legs nearly as broad and only slightly shorter than their respective tibiae; tegulae shining, very minutely and closely punctate; front wings deep fuliginous, hind wings somewhat less so, veins brownish-piceous; abdominal terga only slightly depressed basally, basal margins of the depressions evident only on 2 and 3, apical margins of the terga deeply depressed laterally, fasciae absent; discal pubescence very short and obscure, suberect, entirely fuscous, somewhat more copious and elongate on basal tergum laterally; punctures of terga fine but distinct, rather uniformly close across basal tergum, becoming more sparse on the more apical terga, depressed margins more deeply, closely and finely punctate; tergum 6 nearly straight in profile, with no erect hairs visible, quite densely covered with fuscous, appressed tomentum, the close and fine punctures visible only at extreme sides of base; sternum 6 bare over apical half, with a bare apical lip projecting slightly beyond the dense, subapical fringe of short, fuscous hairs; scopa entirely black, punctures of sterna rather fine and close, becoming slightly coarser to sternum 5, apical margins of plates very narrowly hyaline, sternal fasciae entirely absent.

MALE—Length 10-13 mm.; black, including tegulae and mid and hind legs in large part, front legs largely yellowish; eyes slightly convergent below; clypeal margin very slightly and broadly produced beneath the dense beard; mandibles 4-dentate (fig. 53), with a broad, sub-basal, triangular, inferior process; apical segment of flagellum somewhat flattened and dilated; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width, strongly narrowed and slightly grooved below base of mandible, posterior margin of this area carinate, a dense fringe of snow-white and rather elongate hairs just above the disc toward posterior margin; vertex shining, punctures quite deep and distinct, not very sparse, well separated in large part, but with an impunctate area between ocelli, and largely impunctate between ocelli and eyes; cheeks quite coarsely and deeply punctate above, becoming very densely and finely tessellate below; face below ocelli beneath dense pubescence very finely and closely rugoso-punctate; pubescence of face creamy-white, dense, copious and quite elongate, rather thin and blackish on vertex, short, thin and whitish on cheeks; pleura largely fuscous pubescent; scutum with erect but rather short and thin, black pubescence, becoming rather narrowly whitish anteriorly, scutellum and posterior face of propodeum with quite elongate, erect, whitish pubescence; punctures of scutum and scutellum quite deep and distinct, rather coarse, somewhat separated medially, becoming close laterally, crowded between notaulices and tegulae, slightly separated on axillae; pleura rather finely and densely rugose; lateral faces of propodeum very finely but rather closely punctate, posterior face somewhat more shining, with minute, close, rather shallow and vague punctures; front coxal spines elongate but rather narrow, subacute apically, each coxa with a small, inconspicuous patch of rather pale setae anterior to the spine, otherwise quite closely and deeply punctate, with a dense patch of pale pubescence laterally; mid tibial spurs absent; front tarsi pale yellow, very broadly dilated, segments 1 and 2 subequal in length on posterior margin, but basitarsus broadly expanded apically, very deeply excavated, overlying segment 2 nearly to its apex, this segment more narrowly produced anteriorly, posterior fringe rather short, hairs tipped with fuscous beneath; front tibia piceous on outer face, yellowish on the other faces, front femora piceous toward apex on posterior face, lower margin conspicuously carinate, otherwise pale yellowish, with a conspicuous, yellowish-white posterior fringe, lower basal margin angulate; mid tarsi slender and very much elongated, rather dark, with brownish-fuscous pubescence and a short, posterior fringe; hind basitarsus rather short, piceous, densely brownish pubescent beneath, forming rather conspicuous anterior and posterior fringes; tegulae very minutely and closely punctate; front wings quite deeply infuscated, hind wings more nearly subhyaline, veins brownish-piceous; abdominal terga 2-5 rather deeply depressed across base, basal margins of the grooves more or less distinctly carinate, apical margins rather deeply depressed laterally on 2 and 3, depression entire on 4 and 5, very deep and abrupt laterally; punctures minute and rather close on basal tergum, minute and well separated on 2 laterally, somewhat closer medially, somewhat deeper and more distinct on 3-5, well separated on 3 becoming closer on 4 and very close on 5; tergum 1 with erect, pale pubescence medially, becoming somewhat

more fuscous laterally; discal pubescence of following terga short, erect and fuscous, apical fasciae entirely absent; tergum 6 completely vertical, very densely and finely rugoso-punctate, quite deeply depressed in center, the carina low but distinct, broadly and shallowly emarginate, the two resulting angles rather narrowly rounded, apical margin without visible teeth; tergum 7 largely hidden, very broadly and obtusely angulate; sterna 1-4 exposed, punctures rather close and fine in general, becoming rather minute and sparse toward margins of 2 and 3, rims very narrowly yellowish-hyaline on 2 and 3, somewhat broader on 4; setose area of sternum 5 rather broadly outcurved apically, separated from basal margin of the plate by a rather broad, membraneous area, setae very fine and dense (fig. 54); setose areas of sternum 6 not completely separated medially, setae rather elongate and more sparse, apical lobe narrowly produced and rounded; gonocoxites robust, rather abruptly narrowed above base, apex conspicuously trilobate (figs. 50 & 55).

DISTRIBUTION—Louisiana and Florida, north to Maryland, March to November.

FLOWER RECORDS — *Bidens, Borrichia, Cephalanthus, Elephantopus, Gaillardia, Helenium, Helianthus, Ilex, Itea, Mikania, Oxypolis, Phaseolus, Polygonum, Rhus, Rubus, Rudbeckia, Senecio, Solidago, Trifolium,* and *Vernonia.* Graenicher (1930) records *xylocopoides* on *Poinsettia* and *Citrus.*

Megachile (Sayapis) frugalis frugalis Cresson

(Figs. 56-58 & 62)

Megachile frugalis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 266. ♂.
Megachile (Sayapis) frugalis Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 183.

FEMALE—Length 12-13 mm.; abdomen elongate and parallel-sided; black, tegulae somewhat more testaceous, legs black and spurs testaceous; eyes subparallel; clypeal margin nearly straight, very narrowly polished and impunctate, this area slightly elevated and sinuate; mandibles 4-dentate, a short bevelled edge between 2nd and 3rd teeth (fig. 56); lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex shining, punctures deep and distinct, quite close medially, becoming slightly separated laterally, rather coarse and well separated on cheeks but becoming fine and close along margins of eyes; face rugoso-punctate in large part, punctures slightly separated only below anterior ocellus, median line and apical margin of supraclypeal area shining and sparsely punctate, clypeus very finely and densely punctate throughout; pubescence white on cheeks, somewhat elongate below, and white between antennae and eyes; clypeus with erect, conspicuous, fuscous pubescence; vertex with somewhat shorter, erect, dark hairs, and area between antennae with a mixture of light and dark hairs; thorax rather thinly whitish pubescent laterally and posteriorly, scutum with very short, erect, fuscous pubescence, becoming pale anteriorly, and scutellum with erect, elongate, fuscous hairs; punctures of scutum quite deep and distinct, slightly separated medially, becoming densely crowded laterally, scutellum rather uniformly, closely but distinctly punctate, median punctures somewhat finer, and axillae with fine, densely crowded punctures; punctures of pleura close but distinct, somewhat shining; lateral faces of propodeum shining, but with exceedingly minute, scattered, vague punctures, posterior face more tessellate, punctures fading out toward median line; basitarsi slender and elongate, definitely shorter than their tibiae; tegulae with only very minute, obscure punctures toward inner margin; wings lightly infuscated basally, becoming rather deeply so apically and in marginal cell, veins brownish to piceous; abdominal terga 2-4 quite deeply grooved across base, apical margins distinctly and rather deeply depressed, basal margin of grooves distinct but not carinate, depressed apical margins occupied by entire, white fasciae; tergum 1 with rather copious, pale pubescence, apical fascia rather poorly developed, discal pubescence of 2-4 very short and inconspicuous, apparently entirely pale, 5 with some pale pubescence basally, but with scattered, erect and rather elongate, black hairs toward apical margins; punctures of terga quite deep and distinct, slightly separated, becoming somewhat coarser on 4 and quite coarse and close on 5; tergum 6 rather strongly upturned apically, surface very densely and rather finely punctate, with numerous, rather long, erect, black hairs, without pale tomentum; sternum 6 well covered with rather short, black, scopal hairs, scopa otherwise pale yellow; the more basal sterna very closely, deeply and distinctly punctate, punctures becoming much more coarse and more distinctly separated on the more apical sterna, apical margins rather narrowly but deeply depressed and hyaline, no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae, and mid and hind spurs testaceous, legs otherwise black; eyes subparallel; clypeal margin nearly straight, with a very shallow, median, incurved area; mandibles 3-dentate (fig. 56), inferior process subbasal, triangularly acute;

apical segment of flagellum slender and elongate; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, somewhat narrowed below, with a slender, acute process just beneath base of mandible; vertex smooth but rather dull, punctures distinct but rather fine and shallow, slightly separated medially, becoming more widely so laterally, quite sparse between ocelli and eyes, fine and close on cheeks above, becoming somewhat coarser and more widely separated below; face rather coarsely rugosopunctate, above, becoming finely so laterally and below, clypeus with quite deep and distinct but very fine and close punctures; cheeks white pubescent, elongate below, shorter above; face with elongate, more or less erect, white pubescence, with a row of conspicuous, erect, black hairs across upper margin of clypeus, with fuscous hairs between ocelli, intermixed with white on vertex; thorax rather short, white pubescent laterally and posteriorly, dorsum also largely pale pubescent, but with rather short, intermixed dark hairs on scutum, scutellum with quite elongate and erect dark hairs; scutum rather dull, punctures quite shallow but distinct, rather uniformly, slightly separated, becoming quite close between notaulices and tegulae, uniformly slightly separated on scutellum, somewhat closer on axillae; pleura rather dull beneath the pubescence, punctures quite close and rather coarse; lateral faces of propodeum somewhat shining beneath the pubescence, obscurely punctate, posterior face dull and tessellate, punctures hardly evident; front coxal spines slender and elongate, rather densely long, white pubescent posteriorly, coxae punctate anteriorly, without distinct patches of bristles at base of spines; mid tibial spurs well developed; front tarsi slender and unmodified, entirely dark, but with a rather distinct, short, posterior, white fringe; mid and hind tarsi slender and simple; tegulae minutely and closely punctate toward inner margin; wings subhyaline basally, becoming somewhat infuscated apically, veins brownish; abdominal terga 2-5 quite deeply depressed across base, basal margins distinct, more or less carinate, apical margins of terga narrowly depressed, rather conspicuously white fasciate; basal tergum with rather copious, elongate, white pubescence, becoming dense at extreme sides, discal pubescence of 2-4 entirely pale, becoming very short on 4, 5 with some pale hairs basally, and rather elongate, erect, dark hairs toward apical margin; punctures of terga rather deep and distinct, quite close but not crowded, rather evenly distributed, becoming somewhat more irregular on 5; tergum 6 vertical, very closely and irregularly punctate but to some degree shining, with a rather deep, median, subapical pit, carina rather low, with a quite deep, semicircular median emargination, irregularly crenulate on each side, median teeth of apical margin evident only as very broad, low carinae which are very close to the acute, quite distinct, lateral angles; tergum 7 somewhat exposed, transverse, with a median, acute but very short process; sterna 1-4 exposed, shining, punctures quite deep and distinct, rather coarse, close toward base but more sparse apically on each plate, apical margins rather broadly and deeply depressed, yellowish-hyaline, with apical fringes of thin, white pubescence; apical margin of sternum 5 with a pair of oblique processes, intervening margin slightly incurved, setae very fine and sparse (fig. 57); setose areas of sternum 6 bilobate on each side, slightly separated medially, basal lobes short, apical lobes more extensive and triangular, apical marginal lobe extensive, broadly truncate; gonocoxites slender, slightly sinuate, and compressed (figs. 58 & 62).

DISTRIBUTION — Pennsylvania and New Jersey to Florida, west to California and Mexico, April to July.

FLOWER RECORDS—*Croton, Erigeron, Eriogonum, Lotus, Opuntia* and *Tephrosia.*

Another form, *pseudofrugalis* Mitchell, occurring in the Southwest, necessitates the use of the subspecific designation for this typical form.

Megachile (Sayapis) inimica inimica Cresson

(Figs. 56, 58 & 61)

Megachile inimica Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 267. ♀.

Megachile inimica Graenicher, 1930. Ent. Soc. Amer. Ann. 23, p. 162. (flower records)

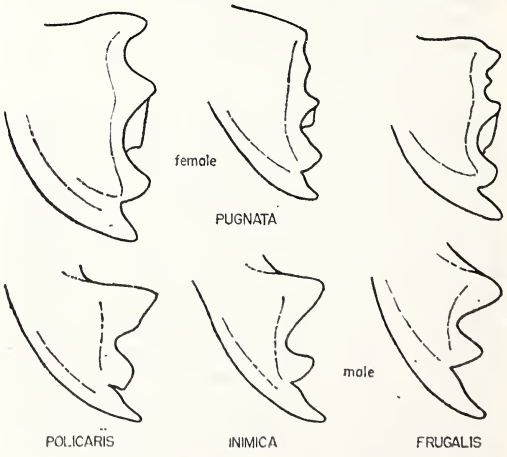


Figure 56
Mandibles in species of *Megachile (Sayapis).*

Megachile (Sayapis) inimica Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 189.

FEMALE—Length 13-16 mm.; abdomen elongate and parallel-sided; black, tegulae yellowish-hyaline, legs ferruginous, spurs yellow; eyes parallel; apical margin of clypeus slightly rounded medially with a more obtuse angle on each side; mandibles 4-dentate, a quite conspicuous bevelled edge between 2nd and 3rd teeth; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks very slightly broader than eyes below, somewhat narrower above; vertex somewhat shining, punctures quite deep and distinct, slightly separated, of two rather distinct sizes, cheeks quite closely punctate somewhat more coarsely so below, becoming very fine and quite close along margin of eyes, especially above; face below ocelli quite densely rugoso-punctate, becoming more distinctly but closely punctate laterally, supraclypeal area considerably swollen, punctures quite coarse and densely crowded, those on clypeus very close but distinct and quite coarse; pubescence white but rather short on face laterally, between antennae and on cheeks, becoming somewhat more elongate on cheeks below where there are intermixed, yellow hairs; clypeus with erect, rather conspicuous, yellowish pubescence; vertex rather sparsely beset with erect, more fusous hairs; thorax rather thinly white pubescent laterally and posteriorly, with snow-white tufts of tomentum around tubercles; scutum with very short and obscure, erect, dark hairs, those on scutellum rather sparse and elongate; scutum densely and rather finely punctate in large part, punctures slightly separated only in center; scutellum quite flat, punctures close but irregular, rather fine and densely crowded on axillae; pleura dull, punctures rather coarse but densely crowded throughout, lateral faces of propodeum somewhat smoother but rather dull, posterior face more velvety, punctures very vague and obscure, hardly evident; front and mid basitarsi distinctly narrower and shorter than their tibiae, hind basitarsi nearly as broad and fully as long as their tibiae; tegulae shining, punctures hardly evident; wings rather deeply infuscated, veins brownish-piceous; abdominal terga 2-4 with very deep and entire, sub-basal grooves, basal margins of grooves distinct but not carinate, apical margins of terga 2-5 quite abruptly and deeply depressed, rather thinly white fasciate, the fasciae more dense and conspicuous laterally; tergum 1 with rather thin and elongate pale pubescence, discal pubescence of 2-4 very short and inconspicuous but quite copious, largely dark, that on 5 and 6 more elongate and conspicuous; punctures of terga fine but deep and distinct, close on the more basal terga, becoming somewhat more widely separated on 4 and 5 apically; apical rounded apex of tergum 6 rather sharply upturned, surface very densely and rather finely rugoso-punctate, with no pale tomentum evident; sternum 6 rather uniformly covered with very short, blackish, scopal hairs, the tip very slightly incurved or emarginate, without a definite apical fringe; scopa otherwise yellowish-white, the more basal sterna with very fine and close punctures, these becoming more coarse and distinct on the more apical sterna, apical margins rather deeply depressed and yellowish-hyaline; no sternal fasciae evident.

MALE—Length 11-14 mm.; black, tegulae yellowish-testaceous, legs ferruginous, but front tarsi and spurs yellowish; eyes subparallel; clypeal margin beneath beard nearly straight, but with a very shallow, median, incurved area; mandibles 3-dentate (fig. 56), inferior process sub-basal, rather short, subacute, lower margin and tip very densely short, pale pubescent; apical segment of flagellum slender and elongate; lateral ocelli considerably nearer eyes than to margin of vertex; cheeks subequal to eyes in width, narrowed and very densely pubescent below, with a conspicuous, flattened protuberance just beneath base of mandible, which is densely pubescent on its lower surface; vertex somewhat shining, punctures deep and distinct, but rather fine and uniformly close, fine and close on cheeks above, becoming obscure or sub-rugose below, a narrow, transverse, impunctate line near lower margin, clothed on upper side by a narrow fringe of white hairs, with very dense and abundant, long white pubescence below; entire face and clypeus below ocelli very finely and densely rugose beneath dense pubescence; face with copious, yellowish-white, more or less erect pubescence, that on cheeks white, rather thin above, dense and elongate below, short and more or less fuscous across vertex; thorax with rather short and dense, white pubescence laterally and posteriorly, scutum with rather short, erect, fuscous pubescence, becoming whitish anteriorly, scutellum with a few dark hairs interspersed in the generally elongate, erect, whitish pubescence; dorsum of thorax rather dull, punctures finely and densely crowded throughout; pleura dull beneath the pubescence, punctures densely crowded throughout, lateral faces of propodeum somewhat smoother, with numerous, shallow and rather obscure punctures, posterior face becoming somewhat more velvety, punctures more shallow and obscure; front coxal spines slender and elongate, surface of coxae quite flat, with a small patch of robust, ferruginous bristles anterior to each spine; front tarsi yellow, basitarsus dilated and deeply exacavated anteriorly, somewhat broader than their tibiae, the resulting anterior scale produced

over segment 2 but not attaining its tip, anterior and posterior margins of the segment somewhat brownish, posterior creamy-white fringe rather short but dense, more or less yellowish beneath; combined length of segments 2 and 3 about equal to basitarsus, each with a rather obscure, posterior, integumental dark spot; mid and hind basitarsi slender and elongate, much shorter than their tibiae; mid tibal spurs well developed; tegulae shining, punctures exceedingly minute but rather close; wings subhyaline basally, becoming faintly infuscated apically, veins brownish testaceous; abdominal terga 2-5 quite deeply grooved or depressed across base, basal margin of these grooves quite sharply carinate, apical margins of terga rather narrowly but abruptly depressed, with entire, dense, pale, apical fasciae; pubescence of basal tergum rather copious and elongate, entirely whitish, discal pubescence of following terga very short but quite dense, fuscous to black, some pale pubescence across base of 2, and 5 with suberect, and more elongate, fuscous hairs; punctures of terga very fine but quite deep and distinct, uniformly close on 2-4, becoming somewhat more irregular and obscure on 5; tergum 6 nearly vertical, very finely and densely rugoso-punctate, carina rather low but abrupt, broadly rounded and very shallowly emarginate medially, no pale tomentum evident, but with scattered, erect, fuscous hairs, median teeth of apical margin evident only as very low, transverse carinae which are much nearer each other than to the obscure lateral angles; tergum 7 barely evident, slightly acute medially; sterna 1-4 exposed, quite deeply and distinctly punctate, punctures rather coarse toward base of each plate, becoming more sparse apically, apical margins rather deeply depressed, yellowish-hyaline, not conspicously fringed; setose area of sternum 5 covering most of apical half of plate, the setae sparse and simple, more robust toward base; setose areas of sternum 6 rather widely separated, obscurely bilobate, basal lobes elongate and acute laterally, with simple, long and robust setae, the apical lobes produced laterally, fringed with 2 or 3 rows of robust, flexed and dilated setae, apical marginal lobe of plate broad, truncate apically; (fig. 61) gonocoxites constricted above base, slightly dilated and obliquely compressed apically (fig. 58).

DISTRIBUTION—Florida to Texas, and south to Guatemala, February to April.

FLOWER RECORDS — *Achyranthes, Avicennia, Borrichia, Coccoloba, Laciniaria, Ocimum, Salvia, Vitex* and *Ximensia.* Graenicher records this species on *Bidens* and *Crotalaria.*

Megachile (Sayapis) inimica sayi Cresson

Megachile sayi Cresson, 1878. Amer. Ent. Soc. Trans. 4, p. 119. ♂ ♀.
Megachile heterodonta Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 18. ♀.
Megachile sayi paludicola Cockerell, 1911. U. S. Natl. Mus. Proc. 40, p. 254. ♀.
Megachile sayi var. *sancta* Cockerell, 1912. Ann. Mag. Nat. Hist. (8) 10, p. 487. ♂.
Sayapis sayi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Sayapis) inimica var. *sayi* Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 192.

This is the more northern form of this species which differs from the typical form chiefly in the black legs in both sexes. The pubescence, including the fasciae, is usually white in *sayi*, while in typical *inimica* there is a considerable tendency to yellowish color of pubescence. No differences of structure or sculpture that seem to be of any consequence have been found.

DISTRIBUTION—Pennsylvania to Florida, west to California and Mexico, July to September, and in Florida, to November.

FLOWER RECORDS—*Chrysopsis, Cleome, Coreopsis, Gilia, Helenium, Helianthus, Heliopsis, Melilotus, Strophostyles, Verbena* and *Vernonia.* Robertson (1929) records this subspecies on the following: *Arctium, Aster, Bidens, Blephilia, Braunneria, Cephalanthus, Lepachys, Liatris, Lythrum, Petalostemum, Pycnanthemum, Rudbeckia, Silphium* and *Teucrium.*

Megachile (Sayapis) policaris Say

(Figs. 56-58)

Megachile policaris Say, 1831. Descr. New Spp. No. Amer. Ins., p. 17. ♀.
Megachile pollicaris Say, 1837. Boston Jour. Nat. Hist. 1, p. 406. ♂. (emend.)
Megachile grandis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 268. ♀.
Megachile pollicaris var. *perexima* Cockerell, 1900. Ann. Mag. Nat. Hist. (7), 6, p. 12. ♂.
Megachile vallorum Cockerell, 1900. Ann. Mag. Nat. Hist. (7) 6, p. 18. ♀.
Sayapis pollicaris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Sayapis) pollicaris Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 197.

FEMALE—Length 14-15 mm.; abdomen elongate and parallel-sided; black, including

tegulae and legs, mid and hind spurs more testaceous: eyes subparallel; clypeal margin with a rather low but quite distinct tubercle on each side, the rather broad intervening space very slightly outcurved, narrowly shining and impunctate; mandibles 4-dentate, with a very low, bevelled edge between 2nd and 3rd teeth (fig. 56); lateral ocelli somewhat nearer eyes than to margin of vertex; cheeks subequal to eyes in width; vertex somewhat shining, punctures quite deep and distinct but rather fine, close in large part, being slightly separated laterally, very close and fine on cheeks above, becoming somewhat coarser but more shallow and vague below; face below ocelli finely and densely punctate, supraclypeal area rather finely rugose, becoming very narrowly shining, with a few distinct punctures toward clypeus which is uniformly very finely and closely punctate, punctures becoming somewhat coarser at extreme sides; pubescence white but rather short on face and cheeks above, becoming somewhat more elongate on cheeks below, quite dense between antennae and on face laterally, vertex with shorter, more erect, fuscous hairs; thorax with rather short, white pubescence laterally and posteriorly, quite dense around tubercles and back of wing bases, very short and largely pale on scutum, becoming more fuscous over posterior half of disc, scutellum with scattered, brownish hairs, interspersed in the generally light, erect and elongate pubescence; scutum dull, punctures very fine, densely crowded in large part, slightly separated only in center, those of scutellum somewhat more sparse but shallow and close, rather obscure, axillae very finely and densely punctate; pleura dull, punctures close but rather shallow, lateral faces of propodeum smoother but rather dull, posterior face dull, with very close, minute and obscure punctures; hind basitarsus nearly as long and broad as their tibiae, front and mid basitarsi distinctly shorter than their tibiae; tegulae very minutely and closely punctate; wings subhyaline, faintly clouded apically, veins brownish-piceous; abdominal terga 2-4 with rather deep, sub-basal, transverse, grooves, basal margins of the grooves distinct but not carinate, apical margins of terga quite narrowly but abruptly depressed, with dense, entire, whitish fasciae; basal tergum with copious, elongate and entirely pale pubescence, discal pubescence of following terga short and black, but erect and quite conspicuous; punctures of terga quite deep, distinct, very fine and close, becoming slightly more distinct on the more apical terga; tergum 6 quite abruptly upturned apically, very densely rugoso-punctate, well covered with short but erect black hairs; sternum 6 well covered with very short, black, scopal hairs, evenly rounded apically, the very short and obscure marginal fringe slightly interrupted medially; scopa otherwise largely yellowish, becoming more or less black

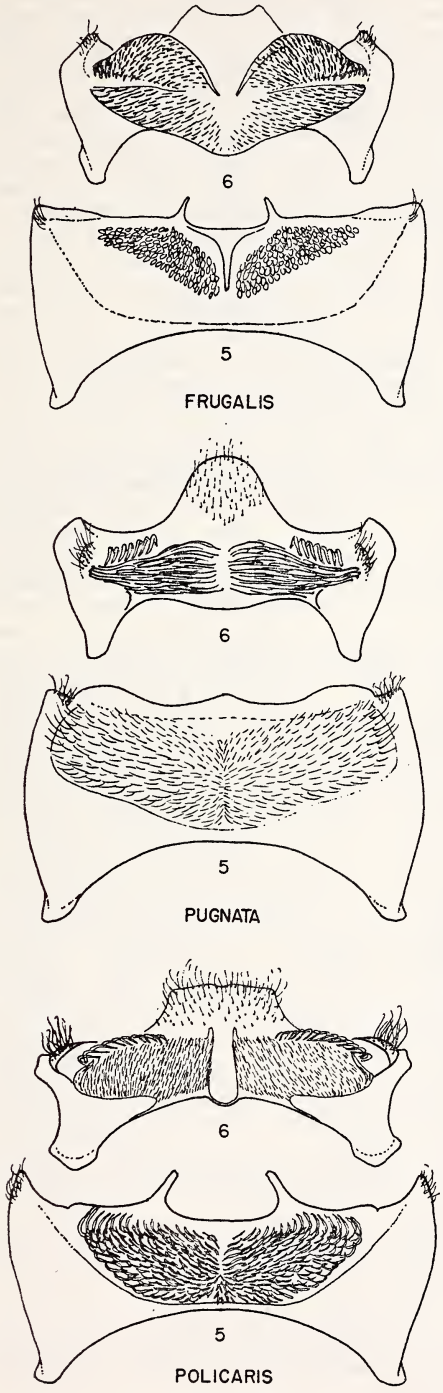


Figure 57
Sterna 5 and 6 in males of *Megachile (Sayapis).*

across apical half of sternum 5; the more basal sterna with fine and close punctures, these becoming more coarse and sparse to sternum 5, apical margins quite distinctly depressed and yellowish-hyaline; sternal fasciae not evident.

MALE—Length 12-13 mm.; black, tegulae more yellowish-hyaline, front legs largely yellowish, middle pair more ferruginous, hind pair black, spurs yellow; eyes very slightly convergent below; clypeal margin very shallowly incurved across median third; mandibles 3-dentate (fig. 56), submedian inferior process broadly, triangularly acute, with a slight angle between its tip and the apical tooth; apical segment of flagellum slightly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, much narrowed below, with a shallow excavation below lower end of eye which is bare, polished and impunctate, a narrow, transverse, impunctate line reaching from this to hind margin, this with a more dorsal fringe of very short, white hairs, and a ventral fringe of elongate, snowy-white hairs; vertex somewhat shining, punctures rather fine, well separated but deep and distinct, becoming somewhat more shallow and obscure on cheeks; punctures of face very fine and densely crowded; face quite densely covered with rather elongate, creamy-white pubescence which largely obscures surface, that on cheeks white, rather short and thin above, that on vertex thin, pale and rather short, but with a few very short, dark hairs on each side; pubescence of thorax rather short but dense and white laterally and posteriorly, very thin and largely pale on scutum and scutellum, with only a very few, very inconspicuous dark hairs at most; scutum dull, densely tessellate between very fine and close punctures, those on scutellum somewhat more distinct and more widely separated, axillae very finely and closely punctate; pleura dull, punctures rather coarse but very close, becoming crowded above, interspaces more or less tessellate, lateral faces of propodeum smoother but rather dull, posterior face with minute, vague, rather close punctures evident; anterior coxae bright yellow, the spines very slender and elongate, slightly diverging apically, with a few white hairs posteriorly, coxae largely bare but with a single, very robust, ferruginous bristle near anterior border, which is directed toward the spine, some dense, white pubescence at each extreme side; front trochanters and femora largely yellow, quite conspicuously fringed posteriorly, with dense, elongate, white pubescence; front tibiae yellow in large part, but somewhat more ferruginous on outer surface toward base; front basitarsus enormously expanded and very deeply excavated, the resulting scale slightly narrowed apically where it becomes somewhat more testaceous, tip of the scale reaching fully to tip of both 2nd and 3rd segments, 2nd very narrowly produced apically, its hind margin very narrow, hind margin of 3rd very much longer than 2nd, nearly as long as 1st, posterior fringe dense but rather short, largely whitish, more or less tipped with fuscous beneath; mid basitarsus very broadly flattened and expanded apically, broader than their tibiae but not quite equal in length, mid tibial spurs well developed, hind tarsi slender and simple; tegulae minutely and very closely punctate; wings subhyaline, faintly clouded apically, veins brownish-testaceous; abdominal terga 2-5 more or less deeply grooved or depressed across base, basal margin of grooves somewhat carinate, apical margins of terga quite deeply depressed and yellowish-hyaline, with entire, whitish, apical fasciae; basal tergum with rather copious, elongate, erect, pale pubescence, becoming quite dense at extreme sides, discal pubescence of 2 rather pale and elongate, 3 and 4 with very short, erect but rather dense, fuscous pubescence medially, this becoming less evident laterally, 5 with quite abundant, erect and somewhat more elongate, black pubescence; tergum 6 vertical, very densely and finely rugoso-punctate, punctures becoming somewhat more definite toward carina which is rather low, irregularly crenulate, with a somewhat obscure and indistinct, median emargination, median teeth of apical margin evident only as very low carinae which are about as near each other as to the obscure lateral angles; tergum 7 very low and inconspicuous, not produced medially; sterna 1-4 exposed, shining, quite deeply and distinctly punctate, punctures rather fine and close toward base of each plate, more sparse apically, apical margins quite abruptly depressed and yellowish-hyaline; apical margin of sternum 5 with a pair of oblique, slender processes, margin between slightly incurved, setose area occupying much of plate, the setae fine and simple, those toward basal margin more robust (fig. 57); sternum 6 densely long pubescent on each extreme side apically, setose areas slightly separated, bilobate laterally, the lobes superimposed in part, the setae fine toward base, the more apical setae long, flexed and bulbous at base, apical lobe very broad and truncate; gonocoxites narrowed above base, obliquely compressed, slightly dilated apically, the tips somewhat bulbous and finely setose (fig. 58).

DISTRIBUTION—Georgia and Florida, west to California and Mexico, March to August.

FLOWER RECORDS—*Amorpha, Braunceria, Erigeron, Helianthus, Saliva, Senecio*

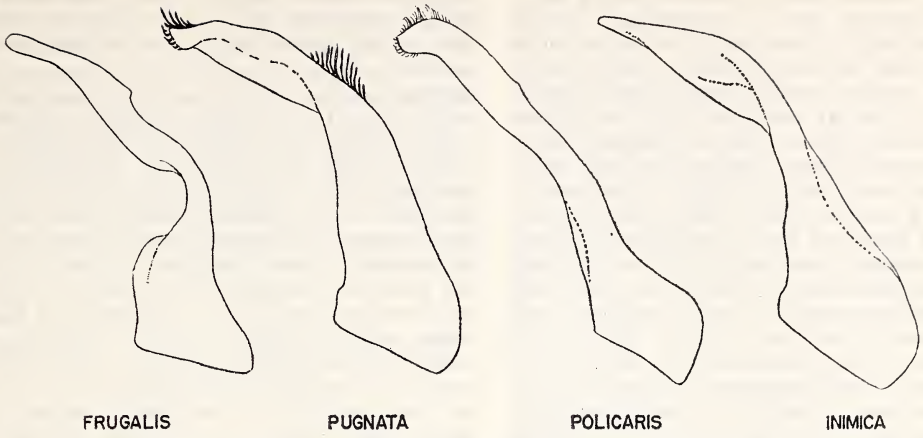


Figure 58—Lateral view of gonocoxites in males of *Megachile (Sayapis)*.

and *Verbena*. Robertson (1929) records it on *Coreopsis, Oenothera, Silphium* and *Verbesina*.

Megachile (Sayapis) pugnata pugnata Say

(Figs. 56-58)

Megachile pugnatus Say, 1837. Boston Jour. Nat. Hist. 1, p. 408. ♂ ♀.
Megachile scrobiculata Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 191. ♂.
Megachile bucephala Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 193. ♀.
Megachile disparilis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 264. ♂.
Megachile lucrosa Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 267. ♀.
Gnathocera cephalica Provancher, 1882. Nat. Canad. 13, p. 233. ♀.
Megachile temporalis Friese, 1903. Ztschr. System, Hym. Dipt. 3, p. 247. ♀. (♂ misdet.)
Megachile scrobiculata Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 337.
Sayapis pugnata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Sayapis) pugnata Mitchell, 1937. Amer. Ent. Soc. Trans. 63, p. 201.

FEMALE—Length 12-18 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs; eyes slightly divergent below; clypeus extremely short and very much thickened apically, the outer face little if any longer medially than the thickened edge, margin with a rather broad, median, truncate protuberance and a pair of more lateral tubercles; mandibles very much broadened apically, obscurely 5-dentate, 4th tooth very low, a small bevelled edge between 2nd and 3rd (fig. 56); lateral ocelli very much nearer eyes than to margin of vertex; width of cheeks nearly twice that of eyes, with a conspicuous, flattened, subtriangular process opposite lower end of eye; vertex rather dull, punctures very fine and close, becoming relatively coarse and more separated on cheeks above, closer and irregular below, but lower surface broadly shining and impunctate; face below ocelli densely rugoso-punctate, conspicuously protuberant between antennae, punctures of supraclypeal area quite coarse and distinct but very close, clypeus with very fine, densely crowded punctures medially, these becoming coarse and more distinct laterally; pubescence white on face and cheeks, short but rather dense between antennae and eyes, more yellowish on clypeus and on lower surface of cheeks, very short and sparse on cheeks above, vertex with quite conspicuous, erect, black pubescence which does not hide surface; thorax with rather short, quite dense, white pubescence laterally and posteriorly, scutum with largely blackish, erect pubescence, this becoming pale across anterior margin, scutellum with somewhat more elongate, black hairs, with a few paler hairs toward posterior margin; scutum finely and closely punctate, punctures slightly separated only in center, those of scutellum and axillae uniformly very fine and close; pleura dull beneath the pubescence, very closely punctate, more coarsely so below and finer above; lateral faces of propodeum somewhat smoother but dull and quite densely pubescent, posterior face rather dull, punctures close but exceedingly minute and vague; all basitarsi somewhat shorter and narrower than their tibiae; tegulae with exceedingly minute and rather close punctures; wings subhyaline basally, becoming somewhat infuscated apically, veins brownish to piceous; abdominal terga

2-5 more or less deeply grooved across base, basal margin of grooves subcarinate, apical margin of terga rather deeply depressed, with dense, entire, whitish fasciae; pubescence of tergum 1 whitish, rather copious and elongate, becoming dense at extreme sides, with some shorter, more apical, fuscous hairs; discal pubescence of following terga very short, erect and quite dense, entirely black; punctures of terga very fine and close throughout; apical margin of tergum 6 rather abruptly upturned, rather narrowly rounded, surface very densely and finely punctate, pubescence suberect and entirely black; sternum 6 subtriangular, with narrow apex, the apex slightly emarginate, surface uniformly covered with short, blackish scopal hairs; scopa otherwise pale yellow, the more basal sterna finely and closely punctate, punctures becoming more coarse and sparse on the more apical sterna, apical margins somewhat depressed, distinctly yellowish-hyaline; sternal fasciae not evident.

MALE—Length 11-13 mm.; black, tegulae brownish-testaceous, front tarsi, and mid and hind spurs yellow; eyes subparallel; clypeal margin beneath beard nearly straight, with very shallow, median and sublateral emarginate areas; mandibles quite slender, obscurely 3-dentate, inferior process submedian, triangularly acute and densely pubescent; apical segment of flagellum very slightly dilated; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, with a shining, impunctate, concave area below, lower margin of this produced to form a conspicuous and rather slender process just below base of mandible; vertex and cheeks rather dull, punctures very fine and densely crowded, face dull, densely and finely rugoso-punctate beneath dense pubescence; face with copious, erect, yellowish-white pubescence that largely obscures surface, cheeks white pubescent, this rather short above, becoming dense and elongate below, vertex with erect and elongate yellowish hairs intermixed with shorter and more fuscous hairs; thorax with rather short, dense, white pubescence laterally and posteriorly, scutum with quite copious, erect and elongate fuscous hairs, becoming whitish anteriorly, scutellum with largely whitish pubescence; punctures of scutum fine and close, slightly separated only in center, densely crowded otherwise, those of scutellum and axillae uniformly fine and close; pleura dull, punctures rather shallow but very close, becoming densely crowded above; lateral faces of propodeum somewhat smoother, punctures shallow, very fine and close, posterior face rather dull, punctures quite close but exceedingly minute; front coxal spines very slender and elongate, anterior surface of coxae bare and somewhat shining, with a patch of 4 or 5 elongate, reddish bristles just before base of spines; mid tibial spurs well developed; front tarsi bright yellow, basitarsus enormously expanded anteriorly and apically, very deeply excavated, inner basal margin of excavation with a short fringe of fuscous hairs, otherwise hairs entirely pale yellowish, the basitarsal scale reaching fully to the tip of segment 2, the more posterior part of 2 much shorter than that of 1 and 3, posterior fringe pale yellow, quite dense and elongate, more or less brownish beneath; outer surface of front tibiae and posterior surface of front femora piceous, other surfaces more or less yellowish or testaceous; mid and hind basitarsi slender and simple, largely dark, the more apical tarsal segments becoming more testaceous or brownish; tegulae shining, punctures exceedingly minute but rather close; wings subhyaline, veins brownish; abdominal terga 2-5 rather shallowly depressed across base, basal margin of these distinct but not conspicuously carinate, apical margin of terga narrowly depressed on the more basal segments, becoming quite broad, more or less yellowish-hyaline and narrowly white fasciate on 4, these fasciae quite dense and conspicuous on 4 and 5; terga 1 and 2 with copious, elongate, pale pubescence, but 2 also with some shorter, more apical, fuscous pubescence, discal pubescence of 3 and 4 short, erect, quite copious and entirely black, that on 5 largely black, but more erect and elongate; punctures of terga very fine and close throughout; dorsal surface of tergum 6 vertical, very densely and finely rugoso-punctate, carina rather short but distinct, with a small, more or less rounded, median emargination, median teeth of apical margin very low, carinate, much closer to lateral angles than to each other, but these lateral angles not at all spinose; tergum 7 rather robust, obscurely angulate medially, but not produced; sterna 1-4 exposed, rather dull but very minutely and regularly punctate, punctures quite close but not crowded, apical margin depressed and yellowish-hyaline, that of 4 very slightly incurved across median area; setose area of sternum 5 broad and extensive, the setae curved and simple, apical margin slightly angulate medially (fig. 57); setose areas of sternum 6 slightly separated, bilobate, the more basal lobes with large, closely set setae, the more apical pair with an apical fringe of 4 or 5 large, curved setae, apical marginal lobe extensive, somewhat narrowed and rounded apically; gonocoxites much narrowed above base, gradually dilated and obliquely compressed to the rounded tips, finely setose on inner surface (fig. 58).

DISTRIBUTION—The Pacific Coast to Quebec and the New England states, south to Texas and Georgia, June to September.

FLOWER RECORDS—*Arctium, Aster, Brauneria, Carduus, Chrysanthemum, Erigeron, Helianthus, Melilotus, Rudbeckia, Taraxacum, Trifolium, Verbena* and *Vernonia.* Robertson (1929) records *pugnata* on the following: *Asclepias, Blephilia, Cicuta Cirsium, Coreopsis, Dianthera, Lepachys, Nepeta, Silphium* and *Verbesina.*

The subspecific designation of this typical form of *pugnata* is made necessary by the occurrence of another form, *pomonae* Cockerell, in the Southwest.

Megachile (Archimegachile) lanata (Fabricius)

(Figs. 59, 61 & 62)

Apis lanata Fabricius, 1775. Systema Ent., p. 385.

Apis purpurea Christ, 1791. Naturgesch. Insekt. Bienen, Wespen u. Ameisengeschl., p. 168, pl. 13, fig. 7.

Megachile lanata Horne, 1870. Zool. Soc. London Trans. 7, pp. 176-177, p. 19, figs. 11, 11a, 11b, (biology).

Megachile Martindalei Fox, 1891. Amer. Ent. Soc. Trans. 18, p. 344. ♀ ♂.

Megachile (Archimegachile) lanata Krombein, 1958. Hym. Amer. n.Mex., U.S.D.A. Agr. Monogr. 2, First Suppl., p. 246.

FEMALE—Length 16 mm.; black, including legs, tegulae yellow; eyes parallel; clypeus somewhat swollen medially; apical margin broadly and very slightly incurved; mandibles quite broad apically, 4-dentate, inner teeth very low, with no bevelled edges evident (fig. 59); space between lateral ocelli and eyes about half that between ocelli and margin of vertex; cheeks slightly narrower than eyes; punctures of vertex quite deep and distinct but close and rather fine, becoming minute and close on cheeks above, somewhat more coarse and sparse below; punctures fine and densely crowded on face beneath dense pubescence, supraclypeal area very finely but somewhat more distinctly punctate, clypeus with a narrow, median, impunctate line, quite deeply and somewhat more coarsely and closely punctate on each side; pubescence of head and thorax bright yellow to rather deep fulvous, very dense at sides of face and around and above antennae, with a dense tuft above anterior ocellus, vertex and cheeks quite short pubescent, becoming somewhat longer on cheeks below, short and dense over most of thorax, becoming somewhat paler below and almost whitish on propodeum; scutum and scutellum very finely, distinctly and closely punctate beneath dense pubescence, punctures on pleura slightly coarser, uniform and close, propodeum somewhat smoother, punctures exceedingly minute, very close on posterior face; all basitarsi very slender and very much shorter than their tibiae; tegulae shining, with minute and rather close punctures; wings lightly infuscated, veins piceous; abdominal terga 2-4 slightly depressed across base, basal margin of this impression distinct but hardly carinate, apical margin of terga depressed, densely and completely fasciate, discs of 1 and 2 densely covered with fulvous pubescence that obscures the surface, that on the following terga much thinner and shorter, largely pale on 3 and 4, but 4 with numerous, suberect, black hairs over apical portion, 5 liberally beset with suberect, black hairs; punctures on the more basal terga minute and close, becoming somewhat more distinct on the more apical terga, well separated but minute on 4 and 5; tergum 6 nearly straight in profile, with very short, suberect hairs visible toward base, quite densely covered with appressed, blackish tomentum, surface barely visible, very finely and densely punctate; sternum 6 well covered with short, black, scopal hairs, scopa otherwise yellowish-white, sterna deeply and distinctly punctate, punctures rather coarse and well separated on 3-5, apical margins narrowly yellowish-hyaline, and sternum 5 with a rather distinct, white, apical fascia.

MALE—Length 13 mm.; black including legs, tegulae yellowish; eyes parallel; clypeal margin about straight beneath the dense beard; mandibles 4-dentate (fig. 59), inferior margin with a very slight angle near base; apical segment of flagellum slender; space between lateral ocelli and eyes about half that between ocelli and margin of vertex; cheeks slightly narrower than eyes; punctures of vertex and cheeks fine and close but quite deep and distinct, becoming slightly coarser on cheeks below, face and clypeus with very fine, close punctures beneath dense pubescence; pubscence of head and thorax entirely pale, that on face below antennae pale yellowish, dense and elongate, becoming more fulvous above, with a dense transverse brush above anterior ocellus, hairs on vertex somewhat shorter, fulvous, becoming more elongate and whitish on cheeks below; venter of thorax rather thinly whitish pubescent, becoming

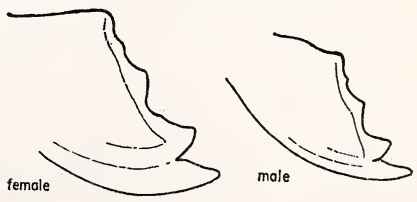


Figure 59
Mandibles in *Megachile (Archimegachile) lanata.*

denser but rather short above, more fulvous in color, entirely deep fulvous, rather short but erect on scutum and scutellum, that on propodeum somewhat thinner and more whitish; punctures of scutum somewhat more distinct and coarse medially, somewhat finer and densely crowded anteriorly and laterally, very fine and densely crowded on scutellum and axillae; pleura somewhat shining, punctures quite deep and distinct, fine and very close above, becoming somewhat coarser and somewhat more widely separated below; propodeum rather smooth, punctures minute and obscure, quite close on posterior face; front coxal spines very short, subtriangular, with narrowly rounded tip, coxae thinly white pubescent anteriorly, spines rather densely long pubescent posteriorly; front tarsi dark, entirely simple; mid tibial spurs well developed; tegulae very minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-5 shallowly depressed across base, basal margin of depressions distinct but hardly carinate, apical margin of terga depressed, with complete, dense, apical fasciae, 1 and 2 densely covered with fulvous pubescence, hiding surface, that on 1 copious and elongate, short on 2, apical fasciae yellow, discal pubescence of 3 much shorter and thinner, largely fulvous, but with a few black hairs apically, 4 and 5 with conspicuous, suberect, black hairs, overlying in part the white fasciae; punctures very fine and very close on the more basal terga, becoming somewhat more coarse and distinct but still quite close on the more apical terga; tergum 6 irregularly and rather finely rugoso-punctate, with conspicuous, long and erect, black, seta-like hairs, carina very low, with a very slight, median emargination, apical margin entirely lacking teeth; sterna 1-4 exposed, quite closely and deeply punctate, finely so on the basal sternum, becoming slightly coarser on the more apical plates, apical margins narrowly yellowish-hyaline, prominantly fringed with whitish pubescence; setose area of sternum 5 broad and expansive, occupying much of the plate, median and apical areas largely bare, setae very abruptly and broadly dilated at tips, apical margin of sternum quite deeply, triangularly emarginate medially, each side quite broadly outcurved (fig. 61); setose area of sternum 6 not divided medially, occupying most of apical half of plate, setae quite robust, directed apically, considerably dilated at tips, plate without an apical lobe; tergum 7 transverse, largely hidden; gonocoxites strongly compressed above base, slightly sinuate, slender and accuminate at tip, with a prominant fringe of plumose bristles on inner surface over apical half, the more basal setae more elongate (fig. 62).

DISTRIBUTION—This is an Old World species, widely distributed through the Ethiopian and Oriental regions, and has been established in the West Indies since the days of the slave trade. Within recent years it has appeared in the southern end of Florida, but may or may not have become well established.

Megachile (Chelostomoides) campanulae campanulae (Robertson)

(Figs. 61 & 62)

Oligotropus campanulae Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 171. ♀ ♂.

Megachile campanulae Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 202. (biology)

Oligotropus campanulae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Chelostomoides) campanulae Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 389.

FEMALE—Length 10-11 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs, spurs yellow; eyes subparallel; clypeal margin with a pair of distinct tubercles, one on each side of midline, and a slightly smaller one toward the side; mandibles distinctly 4-dentate, without bevelled edges; lateral ocelli very slightly nearer eyes than to margin of vertex; cheeks subequal to eyes in width; punctures of vertex coarse, deep and distinct, uniformly slightly separated, those on cheeks not quite so coarse but considerably closer; face between ocelli and antennae quite coarsely and very closely punctate, fine and densely crowded between antennae and eyes, supraclypeal area with some narrow, shining spaces medially, but punctures coarse and deep, becoming very close laterally, clypeus very closely and coarsely punctate, becoming somewhat more finely and more obscurely so toward apical margin medially; pubescence pale on head and thorax, rather short and thin, whitish and somewhat more copious on face around antennae, on inner orbits and on cheeks below, becoming thin on clypeus, cheeks above and on vertex where it is somewhat more yellowish; pubescence short, thin and entirely white on thorax laterally and posteriorly, quite dense around tubercles, very short, thin and entirely pale on scutum, whitish and somewhat more erect and elongate on scutellum; scutum and scutellum coarsely, deeply and closely punctate throughout, interspaces very narrow but shining, punctures somewhat more widely spaced on scutellum, finer and very close on axillae; pleura somewhat shining between coarse, deep and rather irregular punctures below, these becoming densely crowded anteriorly; lateral

faces of propodeum somewhat smoother but dull, with very close, fine, shallow punctures, posterior face more velvety, punctures very shallow, sparse and irregular; all basitarsi somewhat narrower and shorter than their tibiae; tegulae minutely and closely punctate; wings hyaline basally, becoming faintly clouded apically, veins piceous; abdominal terga 2-4 with deep, transverse, basal grooves, filled to a considerable degree with white tomentum, basal margins distinctly and sharply carinate, apical margins of terga depressed at extreme sides but not medially, the apical, white fasciae evident only toward extreme sides, that on 4 complete but rather narrow medially; basal tergum with rather thin, erect, pale pubescence, lateral angles densely white tomentose; discal pubescence of the following terga extremely thin, entirely pale, hardly evident; tergum 5 faintly grooved toward base but basal margin not at all distinct, apical margin of tergum depressed only toward sides and entirely lacking the apical fascia; tergal punctures quite deep and distinct, variable in size and spacing, rather coarse and sparse medially on each tergum, becoming somewhat closer laterally and toward apical margin, quite fine and close over most of basal tergum, rather uniformly coarse and close on 5; tergum 6 nearly straight in profile, with an abrupt, apical lip, largely covered with pale, subappressed hairs which obscure the surface; sternum 6 covered with short, scopal hairs which are pale toward base but become darker toward apex; scopa otherwise yellowish-white, the sterna rather uniformly, closely, deeply and rather coarsely punctate, apical margins narrowly depressed and very narrowly hyaline; sternal fasciae not evident.

MALE—Length 8-9 mm.; entirely black, including tegulae and legs, spurs yellow; eyes very slightly convergent below; clypeal margin with a quite robust tubercle on each side of mid-line; mandibles 3-dentate, inferior process about median, broadly triangular; apical segment of flagellum slender and parallel-sided; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, shallowly excavated just below base of mandible; vertex shining, punctures coarse, deep and rather sparse, becoming slightly finer and closer on cheeks; face below ocelli coarsely and very closely and deeply punctate, becoming finely rugose laterally and over supraclypeal area, punctures of clypeus very coarse and contiguous, becoming somewhat finer toward apical margin; pubescence of head and thorax entirely pale, rather short and thin, quite copious around antennae and over lower part of face, largely hiding surface, and quite long and copious on cheeks below, becoming thin and short above, thin and erect on vertex; pubescence rather short, thin, entirely white on thorax laterally and posteriorly, quite dense around tubercles, very short and thin on scutum, becoming somewhat more erect and elongate on scutellum; punctures of scutum coarse, deep and close, slightly separated over most of surface, but interspaces very much narrower than diameter of punctures, those on scutellum somewhat more distant, interspaces about equalling diameters, but fine and very close on axillae; pleura somewhat shining below between coarse and deep punctures, these becoming finer and closer above; propodeum laterally somewhat smoother but with very fine, shallow and close punctures, posterior face somewhat more velvety, punctures more minute, sparse and vague; front coxal spines reduced to very obscure, blunt tubercles, coxae quite densely white pubescent; front tarsi entirely dark, segments 1-3 slightly dilated and slightly concave but hardly excavated beneath, with some elongate, brownish hairs along anterior margin, but the usual posterior fringe completely lacking; mid tibial spurs well developed; mid and hind tarsi slender and simple; tegulae minutely and closely punctate; wings subhyaline basally, becoming faintly clouded apically, veins piceous; abdominal terga 2-5 deeply grooved across base, white fasciate, basal margins quite distinctly carinate, apical margins of terga yellowish-hyaline, quite deeply depressed laterally but only slightly so medially, apical white fasciae evident only toward extreme sides of 1-3; basal tergum with rather copious, elongate, white pubescence, discal pubescence of following terga very thin and obscure, hardly evident, apparently entirely pale, 4 and 5 with more conspicuous, very short and erect, pale hairs; tergal punctures deep, distinct and rather coarse, rather uniformly separated, interspaces not much exceeding diameter of punctures, these slightly coarser at extreme sides than in center, tergum 1 more finely and closely punctate; tergum 6 vertical, with a rather dense, basal, white fascia, otherwise quite densely covered with short, suberect, dark tomentum, with a few more elongate, blackish hairs, carina very obscure, with a rounded median emargination, elevated but very slightly on each side above surface of tergum, median teeth of apical margin broadly carinate and very low, largely obscured by dense, white tomentum, very much nearer the acute, lateral teeth than to each other; tergum 7 transverse, not at all produced medially; sternum 4 retracted, entirely hidden but unmodified; sterna 1-3 exposed, quite closely and deeply punctate throughout, 2 and 3 somewhat swollen on each extreme side, apical margins depressed and densely long, white pubescent; setose area of sternum 5 broad, the setae sparse and minute (fig. 61); setose areas of

sternum 6 rather widely separated, oblique, restricted, the setae fine, apical lobe very broad and broadly rounded; gonocoxites narrowed above base, slightly dilated, obliquely compressed toward the rounded tips (fig. 62).

DISTRIBUTION — The New England states to Florida, west to Minnesota, Nebraska and Texas, April to September.

FLOWER RECORDS — *Asclepias, Baptisia, Campanula, Galactia, Malva, Melilotus* and *Oenothera.* Additional records by Robertson (1929) include the following: *Lobelia, Lythrum, Nepeta, Psoralea, Pycnanthemum, Rudbeckia, Strophostyles, Symphoricarpus* and *Verbena.*

Megachile (Chelostomoides) campanulae wilmingtoni (Mitchell)

Oligotropus wilmingtoni Mitchell, 1924. Elisha Mitchell Sci. Soc. Jour. 40, p. 156. ♀ ♂.
Megachile (Chelostomoides) campanulae var. *wilmingtoni* Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 391.

This form largely replaces the more typical form in the coastal areas of the southeastern states and Florida. It differs from the typical form in the somewhat larger size (11-12 mm.), the more deeply infuscated wings, and in the presence of dark pubescence on tergum 6. In the female, the scopal hairs of sternum 6 are entirely black.

DISTRIBUTION — Florida to Virginia, along the coast, April to September over most of its range, but has been collected in November and February in Florida.

FLOWER RECORDS—*Galactia, Melilotus, Pontederia, Solidago* and *Strophostyles.*

Megachile (Chelostomoides) exilis parexilis Mitchell

(Figs. 61 & 62)

Megachile (Chelostomoides) exilis var. *parexilis* Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 393. ♂.

FEMALE—Length 9-10 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs, spurs yellow; eyes subparallel; clypeal margin with a small, very shallow, median, emarginate area, with a small, median tubercle; mandibles 4-dentate, without bevelled edges; lateral ocelli subequally distant from eyes and margin of vertex; cheeks very slightly narrower than eyes; punctures of head and thorax coarse, deep and distinct, uniformly close across vertex, becoming somewhat finer and close on cheeks below, crowded below ocelli and on face laterally, supraclypeal area with some narrow, shining interspaces, clypeus with coarse, crowded punctures above, becoming fine and irregular toward apical margin; pubescence entirely pale on head and thorax, quite short and thin, somewhat more copious between antennae and on sides of face and cheeks below, becoming very short and thin on cheeks above, thin and erect on vertex; thorax with rather short, thin, white pubescence laterally and posteriorly, somewhat more elongate on propodeum, quite dense around tubercles; scutum with very short, thin and obscure, pale pubescence, that on scutellum somewhat more elongate; punctures of scutum uniformly close throughout, those on scutellum somewhat more widely separated but still close, those on axillae finer and densely crowded; pleura with some narrow, shining interspaces, punctures very coarse and deep, becoming relatively fine and close on venter, densely crowded above; lateral faces of propodeum more finely but quite closely and shallowly punctate, posterior face more velvety, punctures very minute, shallow and obscure; all basitarsi somewhat narrower and considerably shorter than their tibiae; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piecous; abdominal terga 2-4 with quite deep, transverse, basal grooves, these sharply carinate basally and more or less occupied by whitish tomentum, apical margins of terga depressed and yellowish or whitish fasciate, completely so on 3-5, but widely interrupted on 2; tergal punctures deep and distinct but rather fine, well separated medially on 3 and 4, rather uniformly fine and close across basal tergum, becoming quite coarse and close laterally on 2-4, 5 with a shallow, basal groove which is not carinate, punctures quite close and irregular throughout; discal pubescence extremely short and thin, hardly evident medially, but becoming somewhat more conspicuous at extreme sides, entirely pale on 1-4, but with sparse, short, erect, dark hairs on 5, tergum 6 nearly straight in profile, with numerous, suberect hairs visible, with an abrupt apical lip, punctures rather fine but deep and densely crowded, partially obscured apically by subappressed, fuscous tomentum; sternum 6 well covered with very short, fuscous, scopal hairs, apex not distinctly fringed; scopa otherwise pale yellow, the sterna deeply, distinctly and closely punctate, somewhat more coarsely so on the more apical sterna, apical margins rather abruptly depressed and yellowish-hyaline; sternal fasciae not evident.

MALE—Length 7-8 mm.; entirely black, including tegulae and legs, but front and mid tarsi brownish-testaceous; eyes very slightly

convergent below; clypeal margin beneath the dense, white beard with a small, median tubercle and a somewhat more robust tubercle on each side; mandibles 3-dentate, inferior process median, broadly triangular, quite densely fringed with short, pale pubescence; apical segment of flagellum slender and simple; lateral ocelli subequally distant from eyes and margin of vertex; cheeks subequal to eyes in width, with a bare, shining, shallowly concave area just below base of mandibles, very densely white pubescent back of this; vertex shining, punctures deep, distinct, rather close and coarse, becoming somewhat finer but still close on cheeks below, densely crowded on face below ocelli, becoming more finely rugose laterally and on supraclypeal area, clypeus with coarse, close, distinct punctures above, these becoming fine and densely crowded apically; pubescence entirely pale on head and thorax, quite copious and elongate, snowy white over most of face, but rather thin and erect on upper area of clypeus, exposing the surface, very short and thin on cheeks above the ventral white tuft, very thin and erect but quite elongate on vertex; pubescence rather thin and entirely white on thorax laterally and posteriorly, quite dense around tegulae, erect and quite thin on scutum, somewhat more elongate on scutellum, dense and snowy white on front coxae and venter; punctures of scutum and scutellum quite uniformly deep, distinct and close, moderately coarse, somewhat finer and more shallow but very close on axillae; pleura with some narrow, shining spaces between the coarse and quite close punctures, these becoming very close above; lateral faces of propodeum very finely and closely punctate, posterior face more velvety, punctures very shallow, sparse and minute; front coxal spines reduced to very small but subacute tubercles; front tarsal segments 1-3 broadly dilated, 1 and 2 quite deeply concave below, segment 2 about half the length of 1, and 3 nearly as long as 2, only slightly narrower but not at all concave beneath, the tarsi rather densely, short, white pubescent anteriorly, with a few, sparse, elongate hairs posteriorly but without a definite posterior fringe; mid tibial spurs well developed; mid and hind tarsi slender and simple, hind tarsi with rather elongate, hairs along anterior margin, forming a loose, indistinct fringe; tegulae minutely and closely punctate; wings subhyaline, veins piceous; abdominal terga 2-5 deeply grooved across base, these subcarinate basally on the more basal terga, more or less densely pale tomentose, apical margins of 2-4 quite deeply and abruptly depressed, yellowish-hyaline, fasciate only at extreme sides, tergum 1 with rather copious, erect, white pubescence becoming dense at each side, with very fine and close punctures medially and apically, these becoming somewhat more coarse laterally and toward the basal concavity; discal pubescence of following terga very obscure, apparently entirely pale, somewhat more elongate toward base of each tergum; tergal punctures deep and distinct, rather coarse but well separated on 2-4, 5 densely white fasciate across base, punctures rather fine and close but irregular, apical margin deeply but very narrowly depressed, not at all fasciate, discal pubescence erect, thin and white; tergum 6 vertical, white tomentose across base, punctures extremely minute and densely crowded, carina very low and obscure, with a shallow, median emargination, median teeth of apical margin triangularly carinate, much nearer the quite robust, acute, lateral teeth than to each other; tergum 7 transverse, rather robust but quite flat medially, this and margin of 6 obscured by dense, white tomentum; sternum 4 entirely retracted, but unmodified; sterna 1-3 exposed, quite deeply and closely punctate, rather coarsely so laterally, apical margins to some degree depressed and with a dense, apical fringe of white pubescence; apical margin of sternum 5 with a dense fringe of short setae on each side, shallowly emarginate between, with a long, posteriorly directed pencil of setae on each side, setose area composed of a pair of short, oblique lines of setae that are slightly separated medially (fig. 61); setose areas of sternum 6 slightly separated medially, broad at inner end, setae very fine or minute, apical lobe very broad, subtruncate; gonocoxites narrowed above base, slender, slightly curved toward tip (fig. 62).

DISTRIBUTION—Maryland and Indiana to Florida, west to Arizona, March to October.

FLOWER RECORDS—*Asclepias, Baptisia, Erigeron, Hydrolea, Ilex, Melilotus, Oenothera, Phaseolus, Rhus, Tephrosia, Trifolium, Vaccinium* and *Vicia.*

Females of this subspecies have been found in fruit fly traps in Florida.

The typical form of *exilis* (Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 265. ♂) is more western in distribution and is nearly identical with this form. Females cannot be satisfactorily separated, but the males differ in the form of the 3rd segment of the front tarsus, this being strongly narrowed apically in typical *exilis*, the apex being only slightly broader than segment 4. In *parexilis* the anterior and posterior margins of segment 3 are nearly parallel, the apex being broadly truncate, much broader than segment 4.

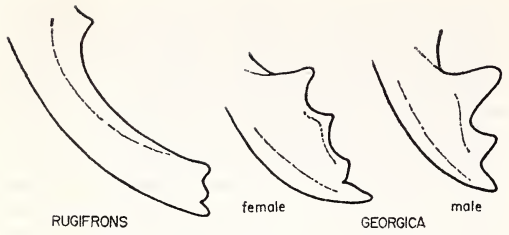


Figure 60
Mandibles in species of *Megachile (Chelostomoides).*

Megachile (Chelostomoides) georgica Cresson

(Figs. 60-62)

Megachile georgica Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 123. ♀ ♂.
Megachile penicillata Cockerell, 1915. Ann. Mag. Nat. Hist. (8) 15, p. 536. ♀.
Sarogaster georgica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Megachile (Chelostomoides) georgica Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 396.

FEMALE—Length 12-13 mm.; abdomen elongate and parallel-sided; tegulae yellowish-testaceous and spurs yellow, otherwise entirely black; eyes subparallel; clypeal margin about straight, unmodified; mandibles broad apically, 4-dentate, without bevelled edges (fig. 60); lateral ocelli considerably nearer eyes than to margin of vertex; cheeks narrower than eyes; vertex shining, punctures deep and distinct, rather coarse and uniformly close; quite coarse and close on cheeks, becoming closer along posterior margin of eyes, irregular and rather sparse on lower surface adjacent to hypostome; punctures below anterior ocellus close, deep and distinct, becoming fine and crowded laterally, very close, deep and distinct on supraclypeal, area, coarse and crowded on clypeus above, becoming somewhat finer and more irregular apically; pubescence white, short but rather copious around antennae and on face laterally, thin and white on cheeks, becoming somewhat longer and more yellowish below, very short and somewhat tinged with yellow on clypeus and vertex; pubescence rather short, thin, entirely white on thorax laterally and posteriorly, dense around tubercles and behind bases, very short, thin, largely pale and very inconspicuous on scutum and scutellum, a pair of anterior, slightly oblique, narrow lines of white tomentum on scutum, the scutello-mesothoracic suture narrowly tomentose; dorsum of thorax closely, deeply, rather finely and closely punctate throughout, punctures of pleura much coarser, with irregular, shining spaces evident; lateral faces of propodeum somewhat shining, but finely and closely punctate, posterior face somewhat more tessellate, punctures very shallow and irregular; all basitarsi considerably shorter and narrower than their tibiae; tegulae minutely and closely punctate; wings lightly infuscated, somewhat more deeply so apically, veins piceous; abdominal terga 2-4 with deep, transverse, basal grooves which are rather thinly pale tomentose, their basal margins sharply carinate, apical margins of terga quite deeply and abruptly depressed except on 2 medially, rather conspicuously white fasciate, this fascia broadly interrupted on 2 and narrowly so on 3; basal tergum with some erect, rather elongate, pale pubescence laterally, becoming very thin medially, lateral apical angles densely white tomentose, punctures rather sparse and shallow, becoming fine and close toward margin; discal pubescence of following terga very thin and inconspicuous, hardly evident, largely pale, punctures of 2-4 medially deep and distinct but rather fine and sparse, becoming somewhat coarser and closer at extreme sides; tergum 5 not definitely depressed nor grooved basally, apical margin quite deeply depressed but not fasciate, punctures deep, distinct and quite close, rather finely so toward base, more coarsely so toward apical margin, pubescence thin, short and erect, largely pale; tergum 6 very slightly convex in profile, but with an abrupt, apical lip, a considerable amount of pale, subappressed tomentum across base, this becoming fuscous toward apical margin, punctures very deep and distinct, very close, but rather coarse; sternum 6 well covered with short, black, scopal hairs, deeply and distinctly but irregularly punctate; scopa otherwise white, the sterna quite uniformly, closely, deeply and rather coarsely punctate, apical margins depressed and narrowly hyaline; no sternal fasciae evident.

MALE—Length 10-11 mm.; black, tegulae and front tarsi yellowish-testaceous, spurs yellow; eyes very slightly convergent below; median third of clypeal margin slightly incurved; mandibles 3-dentate, inferior process somewhat nearer apex than base, subtriangular and rather small, the tip incurved; apical segment of flagellum very slightly dilated medially; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes, with a very small, bare, concave area just below base of mandibles, otherwise lower margin densely long, white pubescent; vertex shining, punctures uniformly deep, and distinct, rather sparse and slightly separated, becoming somewhat more shallow but close and rather coarse on cheeks; face below ocelli with coarse and deep, crowded punctures, becoming minute and close laterally and on supraclypeal area, clypeus with an inconspicuous, median, sparsely punc-

tate line, very closely and deeply punctate on each side; pubescence of face quite short but rather dense, entirely white, and white on cheeks, dense below, very thin above, vertex with thin and rather short, erect, more yellowish hairs; thorax with short, white pubescence laterally and posteriorly, dense around tubercles and behind wing bases, short, erect and very thin on dorsum, obscurely yellowish on scutum medially, with a pair of somewhat oblique, very narrow lines of tomentum anteriorly, and scutello-mesothoracic suture narrowly white tomentose; scutum closely and deeply punctate throughout, punctures somewhat coarser in center, finer laterally, those on scutellum somewhat finer and more widely separated but still quite close, those on axillae fine and very close; punctures of pleura much coarser but rather shallow, rather fine and densely crowded on venter, lateral faces of propodeum somewhat shining, but closely and rather finely punctate, posterior face less shining, punctures shallow, becoming quite sparse near mid-line; front coxal spines rather slender and elongate, narrowly rounded at tip, the coxae largely bare anteriorly, very finely and irregularly punctate, without red bristles; front basitarsus narrow at base but becoming broadly dilated apically, somewhat broader than its tibia, flattened but not excavated below, segment 2 much shorter but about as broadly dilated apically, with a brownish integumental spot beneath, 3rd and 4th segments quite short, slender and narrow, the 5th more elongate but definitely shorter than the basitarsus, the more basal segments rather densely, short white pubescent, without a distinct posterior fringe; mid tibial spur well developed; mid and hind tarsi slender and unmodified, basitarsi much shorter than their tibiae; tegulae minutely and closely punctate; wings very lightly infuscated, veins brownish to piceous; abdominal terga 2-5 rather deeply grooved across base, grooves quite densely white tomentose, basal margins distinct, subcarinate, apical margins of terga depressed except on 2 medially, the depressed margins yellowish-hyaline and densely white fasciate laterally except on 4, basal tergum with rather thin, erect, whitish pubescence, the lateral posterior angles densely white tomentose, punctures quite close and deep throughout; discal pubescence of following terga very short, thin and inconspicuous, hardly evident, whitish and somewhat more conspicuous toward basal grooves, becoming somewhat more blackish on apical terga; punctures of terga 2-4 deep and distinct, rather sparse medially, becoming close and coarse laterally, somewhat closer on 4, 5 densely white tomentose across base, but with short, erect but quite conspicuous, black pubescence, closely, deeply and rather coarsely punctate, apical margin very narrowly depressed, entirely black and not fasciate; tergum 6 densely, white tomentose across base, surface very finely and densely punctate, carina very low and inconspicuous, but with a rather broad, semicircular, median emargination, straight on each side, median teeth of apical margin low and carinate, considerably nearer the quite distinct and acute lateral angles than to each other, this area obscured with dense tomentum; tergum 7 rather inconspicuous, transverse, not at all produced medially; sternum 4 entirely retracted but unmodified; sterna 1-3 exposed, very closely, deeply and rather coarsely punctate, becoming somewhat more finely so toward apical margin of each, this rather broadly depressed on 2, more narrowly so on 3, with dense, apical fringes of rather elongate, white hairs; setose area of sternum 5 divided medially by a non-setose line, the setae fine and simple, numerous toward apical margin and median line (fig. 61); setose areas of sternum 6 broad and extensive, slightly separated medially, the setae flexed apically and rather robust, apical lobe very broad and broadly rounded; gonocoxites abruptly narrowed above base, then slightly dilated to the obliquely flexed and robust tips (fig. 62).

DISTRIBUTION—New Jersey to Florida and Texas, March to November.

FLOWER RECORDS—*Afzelia, Amorpha, Baptisia, Chrysopsis, Clethra, Crotalaria, Erigeron, Galactia, Helenium, Hypericum, Lobelia, Melilotus, Pentstemon, Phaseolus, Psoraelea, Pycnanthemum, Stachys, Strophostyles, Tephrosia* and *Vaccinium.* This is also recorded by Robertson (1929) on *Desmodium.*

Megachile (Chelostomoides) rugifrons (Smith)

(Figs. 60-62)

Chelostoma rugifrons Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 220. ♀.

Megachile rufimanus Robertson, 1891. Amer. Ent. Soc. Trans. 18, p. 65. ♀ ♂.

Chelostomoides rugifrons Cockerell, 1904. Canad. Ent. 36, p. 301. ♀.

Chelostomoides rufimanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Megachile (Chelostomoides) rugifrons Mitchell, 1938. Amer. Ent. Soc. Trans. 63, p. 412.

FEMALE—Length 13-15 mm.; abdomen elongate and parallel-sided; entirely black, including tegulae and legs, spurs more testaceous; eyes slightly divergent below; clypeus

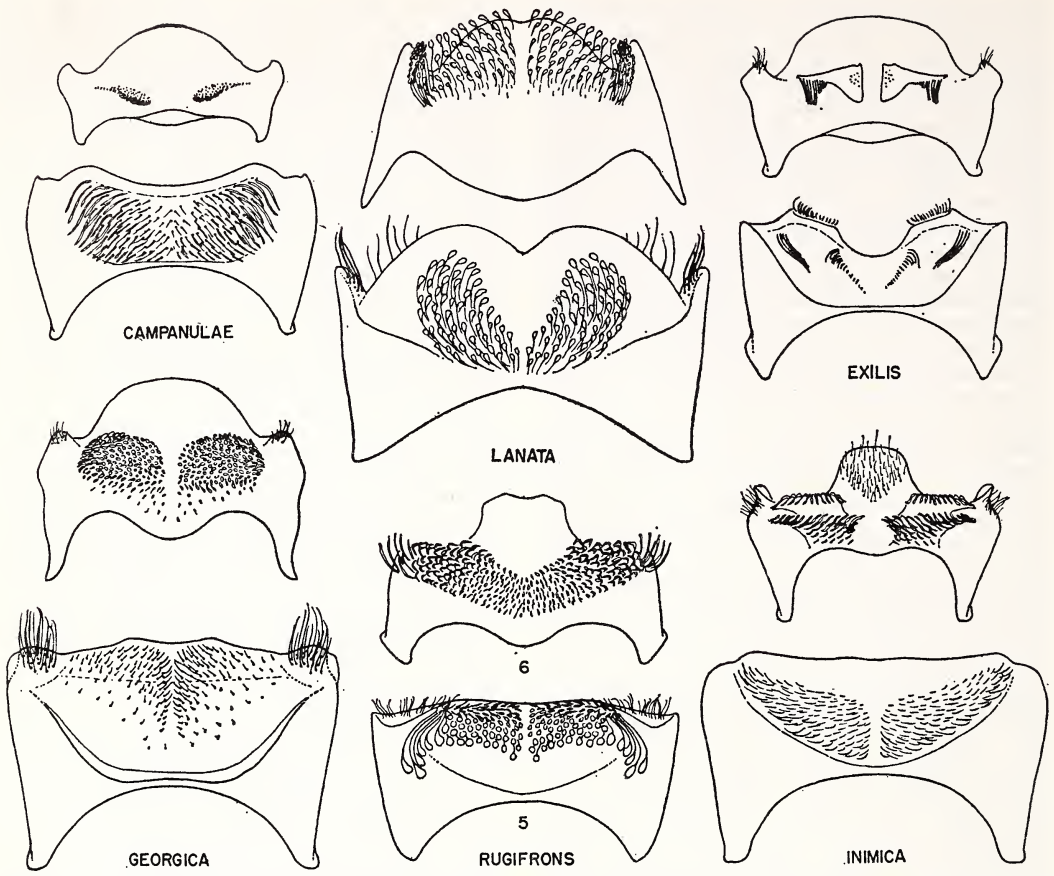


Figure 61—Sterna 5 and 6 in males of *Megachile (Chelostomoides)* and *M. (Archimegachile)*.

much modified, outer face very short, angulate at each side, median area evenly sloped to articulation of labrum, upper portion of this shallowly punctate, apparently representing outer face, while the lower, impunctate, shining area represents the thickened edge; mandibles very slender and elongate, with an obscure, inner, basal angle, and with three small apical teeth (fig. 60); labrum much elongated, slightly narrowed just before apex, median length much greater than basal width; lateral ocelli very much nearer eyes than to margin of vertex; cheeks somewhat broader above than eyes, much narrowed below; punctures of vertex and cheeks coarse, deep and rather close, becoming somewhat crowded and irregular on cheeks below, very slightly separated on vertex medially; face below ocelli rather finely and densely punctate, becoming fine and densely crowded laterally, supraclypeal area shining, with fine, irregular and rather sparse punctures, lateral areas of clypeus with very fine, irregular but rather close punctures; pubescence white on face and cheeks, somewhat more yellowish on clypeus, labrum and cheeks below, short but rather dense around antennae and on face laterally, thin on cheeks, and vertex with short, erect, very inconspicuous, fuscous pubescence; thorax with thin, white pubescence laterally and posteriorly, this quite dense around tubercles and behind wing bases, scutum with very short, erect but rather thin, fuscous pubescence, this becoming more whitish anteriorly, and with a pair of fine, slightly oblique, anterior lines of white tomentum, scutellum with somewhat longer, erect, fuscous hairs; scutum with deep and distinct, rather fine and close punctures throughout, being slightly separated only in center posteriorly, scutellum with more widely separated and considerably coarser punctures, those on axillae very fine and close but distinct; punctures of pleura rather shallow but quite coarse, uniformly close, becoming crowded above; lateral faces of propodeum somewhat smoother, with very fine, close, shallow punctures, posterior face dull, with close, fine punctures; all basitarsi considerably shorter

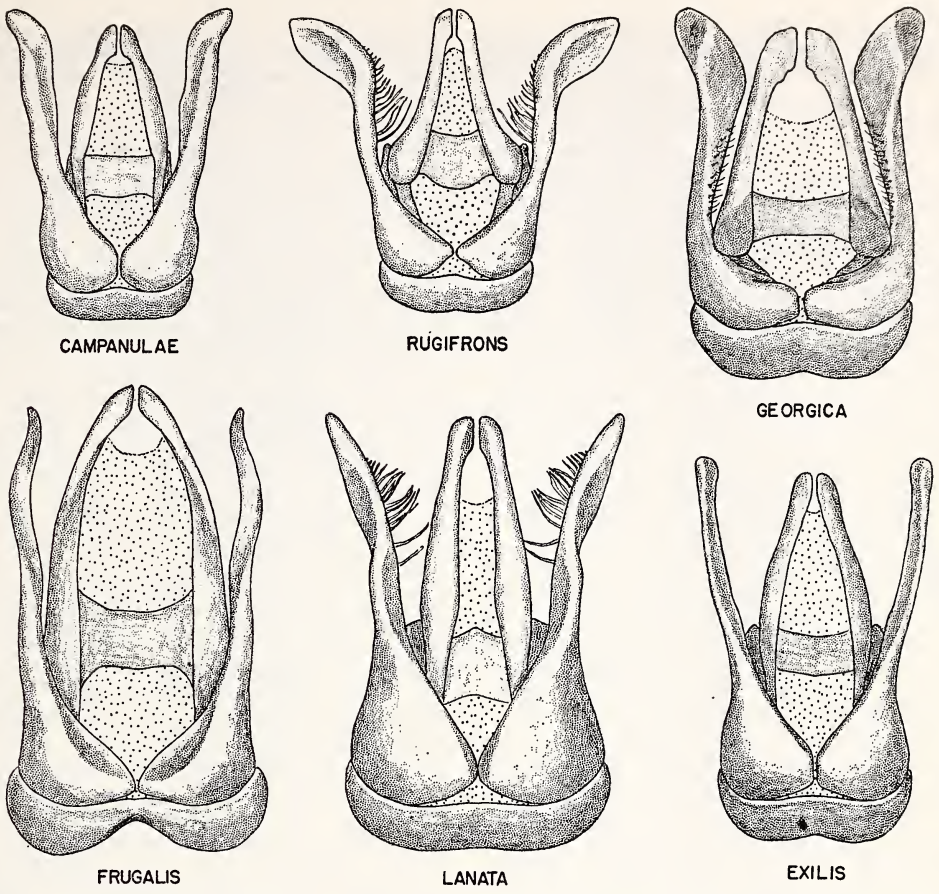


Figure 62—Genital armature in males of *Megachile (Chelostomoides)*, *M. (Archimegachile)*, and *M. (Sayapis).*

and narrower than their tibiae; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 rather deeply depressed across base, these depressions largely devoid of pale tomentum, basal margin distinct, subcarinate, apical margins of 2-4 with entire, white fasciae, these narrow medially but quite dense laterally, margins only slightly depressed except at extreme sides; basal tergum with very thin and rather short, pale pubescence, the lateral, apical angles becoming very densely white tomentose, punctures deep and distinct, but rather fine and only slightly separated; discal pubescence of following terga very obscure, short and sparse, largely pale on 2-4, the punctures deep, distinct but fine and quite sparse medially becoming quite coarse and close laterally; tergum 5 with a shallow indefinite, sub-basal impression which is not at all carinate, apical margin rather deeply depressed but not fasciate, punctures fine and rather close, slightly separated only in center, with rather copious but very short, erect, blackish pubescence; tergum 6 nearly straight in profile, with an abrupt, apical lip, quite densely white tomentose across base, otherwise with short, erect, black hairs, punctures rather fine and densely crowded; sternum 6 deeply and very closely punctate, well covered with short, dark, scopal hairs, these becoming somewhat paler toward base, the apex narrowly subtruncate; scopa otherwise pale yellowish-white, sterna uniformly very closely, deeply and rather coarsely punctate, apical margins narrowly depressed, very narrowly hyaline; sternal fasciae absent.

MALE—Length 9-10 mm.; black, tegulae more testaceous, front tibiae bright yellow anteriorly, mid and hind legs largely dark, spurs pale yellow; eyes subparallel; median third of clypeal margin straight but very slightly produced; mandibles 3-dentate, without an inferior process; antennae markedly slender and elongate, flagellum somewhat red-

dened beneath; lateral ocelli slightly nearer eyes than to margin of vertex; cheeks slightly narrower than eyes; punctures of vertex and cheeks very coarse and deep, slightly separated on vertex medially, becoming relatively close and irregular on cheeks below; face below ocelli densely rugoso-punctate, becoming very minutely roughened or tessellate laterally and on supraclypeal area, clypeus very finely and densely rugoso-punctate beneath dense pubescence; face and clypeus with rather copious, elongate, white pubescence, largely hiding surface, cheeks below with elongate but somewhat thinner white pubescence, this becoming shorter above, thin, elongate, erect and more yellowish on vertex; thorax with rather short, white pubescence laterally and posteriorly, quite dense around tubercles and behind wing bases; scutum with erect, somewhat shorter, dark hairs, these becoming pale anteriorly, with a pair of very short anterior lines of white tomentum, scutellum with somewhat longer, erect, largely pale hairs; punctures of scutum close, deep and distinct throughout, somewhat finer laterally, and to a slight degree separated near center posteriorly, scutellum with somewhat coarser, more widely separated punctures, these fine and close on axillae; pleura dull, punctures shallow but very coarse and close; lateral faces of propodeum rather dull, punctures close but shallow and obscure; front coxae with neither spines nor tubercles, quite densely pale pubescent; front tarsi rather pale, but slender and simple, with a rather short and thin, pale, posterior fringe; anterior face of front tibiae bright yellow, in some contrast to the outer, somewhat more reddened face, and front femora yellowish on apical portion of anterior face; mid tibial spurs well developed, the mid and hind tarsi slender and simple; tegulae minutely and closely punctate; wings subhyaline, veins brownish-piceous; abdominal terga 2-4 rather deeply grooved across base, these grooves with conspicuous, white tomentum, basal margins more or less carinate, apical margins of terga rather broadly depressed, yellowish-hyaline, only obscurely fasciate laterally if at all; basal tergum rather thinly white pubescent, subfasciate apically at extreme sides, punctures deep and distinct, rather coarse, becoming fine along apical margin; discal pubescence of terga 2-4 very short, thin and inconspicuous, hardly evident, punctures deep and distinct, well separated medially, becoming much coarser and closer at extreme sides; tergum 5 densely tomentose across base, apical margin narrowly but deeply depressed, entirely dark and not fasciate, surface somewhat shining medially, with fine, well separated punctures, these becoming coarse and close laterally and apically; tergum 6 narrowly but densely, white tomentose across base, surface dull, very densely and rather finely rugose, carina hardly evident, with a shallow, barely perceptible, median emargination, median apical teeth broadly carinate, much nearer the small but acute lateral angles than to each other; tergum 7 transverse, very low and inconspicuous, not at all produced medially; sternum 4 entirely retracted but unmodified; sterna 1-3 exposed, quite closely and deeply punctate, rather coarsely so laterally, becoming fine medially, apical margins rather narrowly depressed and yellowish-hyaline, 1 and 2 with dense apical fringes of rather elongated, white hairs, the 3rd only inconspicuously fringed laterally; setose area of sternum 5 transverse, subapical setae robust, abruptly flexed and broadly dilated apically, the more lateral setae very long, directed basally (fig. 61); setose areas of sternum 6 not divided medially, closely set with apically flexed, slightly dilated setae, the more lateral of these longer; apical lobe of 6 slightly broader than long, subtruncate; gonocoxites much narrowed above base, then dilated to the robust, laterally flexed tips (fig. 62).

DISTRIBUTION — Nebraska to Michigan and North Carolina, south to Texas and Florida, April to July.

FLOWER RECORDS — *Erigeron, Hypericum, Pontederia, Tephrosia, Vaccinium* and *Verbena.* Robertson (1929) records *rugifrons* (as *rufimanus*) on *Apocynum, Blephilia, Coreopsis, Lobelia, Nepeta* and *Psoralea.*

Table 6—Distribution of species of *Megachile (Phaenosarus, Xanthosarus, Argyropile, Leptorachis, Acentron, Pseudocentron, Melanosarus, Sayapis, Archimegachile* and *Chelostomoides* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Megachile	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New Jersey	New York	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
(Phaenosarus)																											
fortis									X																		
(Xanthosarus)																											
latimanus	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X			X				X	
perihirta								X																			
(Argyropile)																											
parallela									X	X												X		X	X	X	X
townsendiana																						X				X	X
(Leptorachis)																											
petulans									X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X
(Acentron)																											
albitarsis								X		X												X	X	X	X	X	X
(Pseudocentron)																											
pruina																						X	X			X	X
(Melanosarus)																											
bahamensis																											X
xylocopoides																						X		X	X	X	X
(Sayapis)																											
frugalis										X				X	X		X					X				X	X
inimica																											X
i. sayi									X	X	X				X				X			X	X		X	X	X
policaris																										X	X
pugnata			X	X		X	X	X	X	X	X		X		X			X	X	X		X				X	
(Archimegachile)																											
lanata																											X
(Chelostomoides)																											
campanulae				X		X	X		X	X	X		X	X	X	X	X	X	X			X		X		X	X
c. wilmingtoni								X											X			X					X
exilis (western)																											
e. parexilis										X						X		X	X	X	X	X		X	X	X	X
georgica														X		X			X			X	X	X	X	X	X
rugifrons							X	X	X													X				X	X

Coelioxys Latreille

(Figs. 1 & 63)

Coelioxys Latreille, 1809. Gen. Crust. Ins., v. 4, p. 166. Type: (*Anthrophora conica* Fabricius = *Apis conica* Linnaeus) = *Apis quadridentata* Linneaus. Desig. by Latreille, 1810.

Coelioxys subg. *Paracoelioxys* Gribodo, 1884. Soc. Ent. Ital. Bol. 16, p. 274. Type: *Coelioxys montandoni* Gribodo. Monob.

Paracoelioxys Radoszkowski, 1893. Soc. Ent. Rossica Horae 27, p. 53. Preocc. Type: *Paracoelioxys barrei* Radoszkowski. Desig. by Sandhouse, 1943.

Coelioxys Cockerell, 1905. Psyche 12, pp. 87-90. (key)

Coelioxys subg. *Liothyrapis* Cockerell, 1911. U. S. Natl. Mus. Proc. 49, p. 246. Type: *Coelioxys apicata* Smith (= *Coelioxys decipiens* Spinola). Monob.

Coelioxys Cockerell, 1912. Canad. Ent. 44, pp. 168-170. (key to males)

Coelioxys Sladen, 1915. Canad. Ent. 47, pp. 205-208. (key to Ontario spp.)

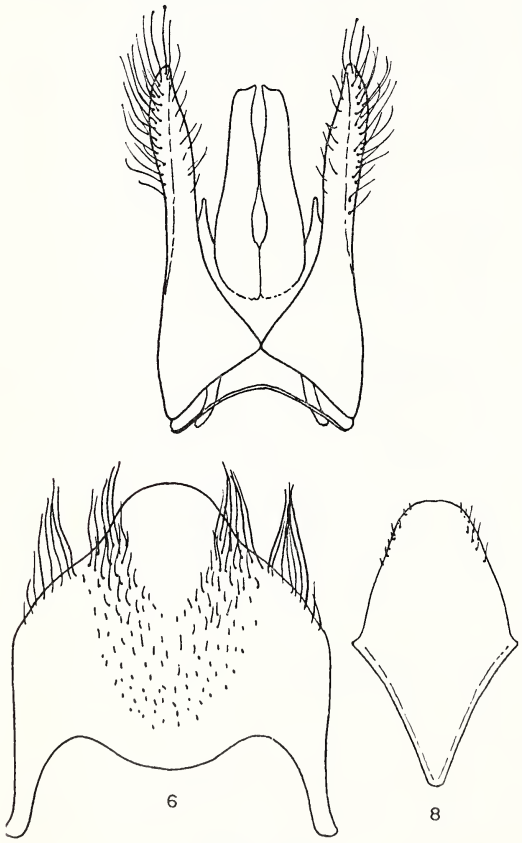


Figure 63
Genital armature and sterna 6 and 8 in male of *Coelioxys sayi*.

Coelioxys Crawford, 1914. Ent. Soc. Amer. Ann. 7, pp. 148-150. (key to females)

Coelioxys Cockerell, 1921. Amer. Mus. Novitates 21, pp. 7 & 8. (key)

These are very coarsely sculptured, parasitic bees, usually black, but ferruginous in part in some of the species. The abdomen in the females tapers posteriorly, often acutely pointed, while in the males it is multispinose at the apex. They are parasitic on species of *Megachile* and have some characters in common with that genus. Thus the notaulices are linear, there are no arolia between the claws, and the basal abdominal tergum is shallowly concave anteriorly. In the males sterna 1-4 are exposed, 5 is largely hidden, while 6 and 8 (fig. 63) are retracted, with 7 not represented by a sclerotized plate. Tergum 6 forms the apex of the male abdomen, usually with three pairs of spines or carinae, one dorsal, another ventral, and a shorter pair lateral in position. As in *Megachile* the true apical margin of the tergum is on the ventral surface. Tergum 7 is much reduced but is usually to some degree visible, while 8 is entirely membraneous. The male genital armature (fig. 63) is relatively simple and unmodified. In both sexes the metanotum and posterior face of the propodeum are perpendicular, the scutellum quite broad and the axillae usually angulate, often conspicuously produced or spinose. The front coxae of both sexes have a pair of robust spines in most species; the pleura are divided into anterior and lateral faces by a vertical carina; the tubercles are carinate; the maxillary palpi are 3-segmented; the mandibles are 3-dentate; and in the front wings both recurrent veins are received by the 2nd submarginal cell. In the conspicuously hairy eyes they differ from all of the related genera of bees.

KEY TO SPECIES

Females

1. Scutellum shining, largely impunctate, posterior margin sharply angulate .... *dolichos* Fox (p. 200)
   Scutellum well punctured 2
2. Posterior margin of scutellum with a distinct median tubercle .... *germana* Cresson (p. 207)
   Posterior margin of scutellum straight or very broadly angular, but without a median tubercle 3
3. Clypeus bilobed . *sayi* Robertson (p. 222)
   Clypeus flat and simple 4

4. Sternum 6 either broadly or narrowly rounded, the sides neither notched, sinuate nor incurved 5
Sternum 6 either notched laterally, or incurved on each side to form an apical, narrowed projection 11

5. Tip of tergum 6 abruptly upturned; basal tergum with both basal and apical white fasciae ..... *modesta* Smith (p. 211)
Tip of tergum 6 not upturned 6

6. Apical portion of tergum 6 impressed on each side of a low median ridge 7
Tergum 6 flattened apically, without any evidence of a median carina 8

7. Sternum 6 rounded, apical half with a fringe of very short hairs ..... *modesta* Smith (p. 211)
Sternum 6 acutely triangular, not fringed ..... *piercei* Crawford (p. 217)

8(6). Clypeus with a short but dense, apical fringe which completely hides the margin ..... *texana* Cresson (p. 228)
Clypeus not densely fringed apically .. 9

9. Punctures of sternum 5 minute and close, markedly different from the coarse sculpture of sternum 4; tergum 6 dull and densely tessellate, punctures fine, but close and deep ..... *hunteri* Crawford (p. 209)
Punctures of sternum 5 not much different from those of sternum 4, becoming rather fine medially and apically; tergum 6 usually shining, punctures minute, rather sparse except along base.10

10. Legs and tegulae piceous to blackish .... *alternata alternata* Say (p. 195)
Legs and tegulae pale ferruginous ..... *alternata wisconsinensis* Cockerell (p. 196)

11(4). Sternum 6 sinuate laterally, without distinct notches 12
Sternum 6 with distinct, though often minute, lateral notches 15

12. Sternum 6 broadly expanded, with a terminal slender spine, and fringed on each side of this spine with equally long, stiff, brownish hairs ..... *obtusiventris* Crawford (p. 214)
Sternum 6 relatively narrow, not of the above form 13

13. Tegulae and entire legs, including spurs, blackish or piceous ..... *sodalis* Cresson (p. 226)
Tegulae, spurs, and at least the tarsi, ferruginous 14

14. Clypeus somewhat enlarged and elevated above general level of face; median posterior area of scutum elevated and sparsely punctate ..... *immaculata* Cockerell (p. 210)
Clypeus not enlarged, flattened, at same level with remainder of face; scutum relatively flat, punctures rather close over most of disc ..... *galactiae* new species (p. 204)

15(11). Scutellum with a distinct, median, longitudinal carina; legs, tegulae, mandibles and venter of abdomen ferruginous; tip of sternum 6 beyond lateral notches accuminate ..... *asteris* Crawford (p. 196)
Scutellum lacking a distinct median carina 16

16. Tergum 6 not carinate apically, being evenly convex from side to side ...17
Tergum 6 with a median, longitudinal carina toward apex, more or less excavated on each side 20

17. Cheeks very narrow, hardly more than half as wide as eyes in lateral view of head 18
Cheeks nearly as wide as eyes ..... *funerarea* Smith (p. 203)

18. Cheeks very narrow, less than half width of eyes; tergum 6 straight at sides, quite narrow and elongate; axilla short 19
Cheeks not so narrow, slightly more than half width of eye; tergum 6 quite broad and short, slightly angulate laterally, tip narrowly truncate; axillae elongate ..... *comstockii* Cresson (p. 200)

19. Abdomen red in large part ..... *slossoni slossoni* Viereck (p. 226)
Basal segment of abdomen red, remaining segments black ..... *slossoni arenicola* Crawford (p. 224)

20(16). Tergum 6 abruptly narrowed near middle, resulting in distinct lateral angles 21
Tergum 6 not angulate laterally 22

21. Scutum uniformly coarsely and closely punctate; tarsi ferruginous, but legs otherwise usually black ..... *rufitarsis* Smith (p. 220)
Scutum anteriorly with coarse but rather sparse punctures, the median anterior margin largely impunctate; legs entirely ferruginous ..... *atlantica* new species (p. 198)

22(20). Front coxae with short, but slender and distinct, acute spines ..... *8-dentata* Say (p. 215)

Coxal spines represented by triangular, acute carinae 23

23. Clypeal margin outcurved, to some degree angulate medially .... *moesta* Cresson (p. 213)
Clypeal margin straight .... *porterae* Cockerell (p. 218)

Males

1. Scutellum shining, largely impunctate, posterior margin angulate .... *dolichos* Fox (p. 200)
Scutellum quite completely punctate, usually not angulate, or very obscurely so 2

2. Posterior margin of scutellum with a distinct median tubercle .... *germana* Cresson (p. 207)
Scutellum not tuberculate 3

3. Abdominal tergum 2 with a pair of deep, very much elongated foveae, each groove about 15 times longer than its width .. .. *rufitarsis* Smith (p. 220)
Foveae of tergum 2, if present, relatively short or shallow 4

4. Basal concavity of abdomen with an elevated, subcarinate rim 5
Basal concavity of abdomen not carinate 7

5. Tergum 7 with a median, apical, triangular spine; tergum 6 quite broad, with two or three apical crenulations between the distinct lateral spines .... *texana* Cresson (p. 228)
Tergum 7 not spinose; tergum 6 narrow, with a pair of ventral, elongate, apical spines and a pair of shorter, dorsal spines 6

6. Basal fringe of tergum 1 composed of elongate, greyish hairs; scutellum with a low, median ridge .... *asteris* Crawford (p. 196)
Tergum 1 with a basal, white fascia; scutellum not ridged .... *modesta* Smith (p. 211)

7(4). Sternum 5 quite fully exposed; apical margin of 4 simple and entire, not depressed, at least in center 8
Sternum 5 retracted, only the apical margin visible in the normal position; apical margin of 4 deeply and abruptly depressed, often emarginate medially . 9

8. Abdomen in large part ferruginous .... *slossoni slossoni* Viereck (p. 226)
Abdominal terga 2-6 black, the basal tergum and all the sterna ferruginous .. .. *slossoni arenicola* Crawford (p. 224)

9(7). Abdominal terga with conspicuous, basal or submedian, widely interrupted, white fasciae, the apical fasciae reduced or interrupted medially; sternum 4 with a wide and deep, median, apical emargination 10
Basal fasciae of abdominal terga, if present, less conspicuous than apical fasciae; emargination of sternum 4 relatively narrow and inconspicuous, if present 12

10. Disc of sternum 4 with a median, apical, emarginate area, and the depressed apical margin with a broad and quite deep, median emargination 11
Disc of sternum 4 not emarginate, but the depressed apical margin with a distinct but narrow, median emargination .... *texana* Cresson (p. 228)

11. Legs entirely black; tegulae piceous to blackish .... *alternata alternata* Say (p. 195)
Legs ferruginous in large part, but tarsal segments darker; tegulae testaceous-hyaline .... *alternata wisconsinensis* Cockerell (p. 196)

12(9). Front coxal spines short, reduced to triangular, carinate ridges .... *floridana* Cresson (p. 202)
Coxal spines well developed 13

13. Tergum 2 not foveate 14
Tergum 2 with a pair of distinct foveae 19

14. Legs black or piceous 15
Legs red, at least in part 18

15. Pubescence of face below level of antennae short, subappressed and very dense ... . *boharti* new species (p. 206)
Clypeus and lower part of face with a dense covering of elongate and erect pale pubescence 16

16. Punctures between transverse grooves and apical margins of terga 2 and 3 deep, distinct, quite coarse, and well separated; tergum 2 usually with a pair of very small and obscure foveae .... *moesta* Cresson (p. 213)
Punctures of terga 2 and 3 beyond the groove either very fine or very close; tergum 2 definitely not foveate 17

17. Transverse grooves of terga 2 and 3 very deep and distinct, becoming median in position at mid-line; dorsal protuberances of tergum 6 very short, broadly rounded, dorso-ventrally flattened .... *piercei* Crawford (p. 217)

Transverse grooves of terga 2 and 3 rather shallow and indistinct, at least at mid-line, quite basal in position; dorsal protuberances of tergum 6 laterally compressed, very short and subacute .. .. *sodalis* Cresson (p. 226)

18(14). Pubescence of face ochraceous, short, dense and subappressed, entirely hiding surface below level of antennae; disc of scutum quite flat, uniformly coarsely punctate ..... *galactiae* new species (p. 204)

Facial pubescence more greyish or cream-color, more elongate and erect; central area of scutum somewhat swollen, the punctures more coarse and sparse, those around notaulices finer and densely crowded *immaculata* Cockerell (p. 210)

19(13). Transverse sulcus of terga 2 and 3 entire, forming a groove across entire width of plate 20

Transverse sulcus of terga 2 and 3 broadly and completely obliterated toward mid-line .... *funerarea* Smith (p. 203)

20. Foveae of tergum 2 broad but very shallow, separated from hind margin of plate by a narrow, densely and very finely rugose area .... *porterae* Cockerell (p. 218)

Foveae of tergum 2 very small, pit-like, but usually deep and distinct 21

21. Vertex more sparsely punctate, interspaces in part much greater than diameter of punctures 22

Vertex more closely punctate 23

22. Legs dark, at least in part; space between lateral ocelli nearly equal to that between ocelli and hind margin of vertex ..... *sayi* Robertson (p. 222)

Legs largely red; lateral ocelli considerably nearer to each other than to hind margin of vertex .... *8-dentata* Say (p. 215)

23(21). Legs and tegulae black; punctures of vertex contiguous .... *moesta* Cresson (p. 213)

Legs and tegulae ferruginous; punctures of vertex to some degree separated ... . *atlantica* new species (p. 198)

Coelioxys alternata alternata Say

(Figs. 64 & 65)

Coelioxys alternata Say, 1837. Boston Jour. Nat. Hist. 1, p. 401. ♀ ♂.

Coelioxys alternata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 13 mm.; black, including legs; eyes subparallel; lateral ocelli considerably nearer each other than to eyes, and slightly nearer margin of vertex than to each other; cheeks narrower than eyes, carinate posteriorly, terminated beneath by a rather acute angle; clypeus very slightly convex, apical margin crenulate; middle tooth of mandible low and inconspicuous; labrum considerably longer than the basal width; punctures rather sparse and shallow across vertex and between eyes and ocelli, with a slightly swollen impunctate area below anterior ocellus enclosing a few very close and fine punctures, a median raised impunctate line reaching from this to the clypeal margin; cheeks rather closely punctate, becoming finely rugose below, punctures fine and close around ocelli, rather shallow and irregular but quite close on the shining clypeus; thoracic punctures coarse and deep, well separated over most of scutum, but very close on scutellum, close on pleura above, becoming distinctly but not widely separated below, propodeum quite smooth but rather dull, with fine, shallow and vague punctures evident, dorsal area velvety, with a narrow line of fine, obscure striations along upper margin; carina of tubercles hyaline, elongate, erect and conspicuous; scutellum rounded, posterior margin slightly elevated medially; axillae slender and distinct, total length not exceeding median length of scutellum (fig. 64); wings subhyaline, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to shining, triangular tubercles; transverse grooves of abdominal terga 2-4 submedian in position, obliterated medially, apical margins of terga not depressed medially, but becoming very narrowly and strongly depressed at extreme sides; tergum 6 elongate triangular, the tip narrowly rounded, lateral margins grooved toward apex, shallowly concave on each side (fig. 65); sternum 6 narrowly rounded apically, reaching much beyond tip of tergum; punctures of abdominal terga rather sparse medially, becoming quite close toward sides, especially basad of the transverse groove of each disc; tergum 6 with very fine, well separated punctures, these becoming very sparse across median area; abdominal sterna yellowish-hyaline apically, discs with deep, distinct, well separated punctures, these becoming very fine and close over median area of 6, and finely rugoso-striate apically; pubescence very short and inconspicuous, entirely pale, forming obscure, tomentose bands on scutum anteriorly and laterally and on anterior and posterior margins of scutellum, the basal tergum with a thin and narrow fascia, evident toward sides both basally and apically; basal grooves and apical margins of the following terga more or less distinctly fasciate at extreme sides.

MALE — Length 10-12 mm.; black, the tegulae more or less testaceous-hyaline, and legs black; eyes very slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; cheeks narrower than eyes, sharply carinate posteriorly, ending at a conspicuous, inferior angle above which it is excavated; clypeus slightly convex, apical margin with 4 low but distinct tubercles; median length of labrum slightly greater than basal width; punctures of vertex coarse and deep but well separated, an impunctate ridge at upper end of each eye, and anterior ocellus surrounded by a largely impunctate, swollen area; punctures of cheeks rather coarse, close and irregular, becoming irregularly and more finely rugose below, punctures fine and densely crowded over median area of face and on clypeus laterally, this more sparsely, irregularly sculptured medially; punctures of scutum coarse, deep, slightly separated in large part, becoming quite close at extreme sides, scutellum very coarsely and closely punctate; punctures of pleura coarse, deep and close above, becoming well separated but hardly sparse below; propodeum dull and densely tessellate, punctures fine, very shallow and obscure, becoming quite close on posterior face, dorsal area smooth and impunctate although dull and tessellate, becoming very narrowly and obscurely striate along upper margin; transverse carina of tubercles strongly elevated and conspicuous; scutellum rounded, hind margin slightly elevated medially; axillae short, total length about equal to median length of scutellum; wings subhyaline basally becoming faintly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to short, carinate tubercles; transverse grooves of abdominal terga sub-basal in position, entirely obliterated medially, largely occupied by densely tomentose fasciae, tergum 1 with a nearly complete, apical fascia, and terga 2 and 3 apically fasciate toward the sides; tergum 6 deeply excavated medially, the dorsal projections irregularly multidentate, ventral spines acute but rather short, lateral spines short but distinct; tergum 7 largely retracted, triangularly acute; apical margin of sternum 4 deeply depressed, with a broad and deep, apical emargination formed by a pair of conspicuous, triangular spines, punctures of abdominal terga coarse, deep and distinct, quite sparse medially, becoming quite close laterally, very fine along margins of transverse grooves on 2 and 3; punctures of tergum 6 very close and rather fine; sternal plates deeply, coarsely and quite closely punctate, especially on the more apical plates; pubescence short, rather thin in general, greyish-white, rather copious around antennae and along margin of clypeus and on cheeks, rather dense around wing bases and on propodeum laterally; gonocoxites of genital armature somewhat enlarged toward apex, only very slightly exceeding penis valves in length, with a few rather short, fine hairs.

DISTRIBUTION — British Columbia to Ontario, Vermont and Massachusetts, south to Florida; April (in Florida) and May to September.

FLOWER RECORDS — *Melilotus* and *Rhus*. Robertson (1929) records this species on *Helianthus, Lepachys, Petalostemum, Pycnanthemum, Rudbeckia, Verbena* and *Verbesina.*

HOST—J. T. Medler has reared *alternata* from nests of *Megachile pugnata.*

Coelioxys alternata wisconsinensis Cockerell new combination

Coelioxys wisconsinensis Cockerell, 1925. Pan-Pacific Ent. 1, p. 145. ♀.

This agrees with typical *alternata* in details of structure and sculpture, differing in both sexes in the color of the legs and tegulae which are bright ferruginous in most specimens. Occasional specimens exhibit some degree of intergradation between the black in *alternata* or the red in this form.

DISTRIBUTION — Michigan, Ontario and New York, south to North Carolina; June and July.

HOST — This subspecies also has been reared from a nest of *Megachile pugnata* by J. T. Medler.

Coelioxys asteris Crawford

(Figs. 64 & 65)

Coelioxys asteris Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 156. ♀.

FEMALE—Length 12 mm.; black, tegulae yellowish-hyaline, legs ferruginous, and abdominal sterna more or less ferruginous; eyes very slightly convergent below; lateral ocelli considerably nearer each other than to eyes, and nearer margin of vertex than to each other; cheeks above much narrower than eyes and becoming very narrow below, inferior angles obscured by short, dense, whitish pubescence; clypeus quite flat, apical margin straight, covered with a dense fringe of yellowish hairs; mandibles conspicuously 3-dentate; length and basal width of labrum about equal; punctures of vertex coarse, deep and

distinct, becoming somewhat more shallow on cheeks, closer and somewhat finer just below ocelli, but fine, dense and irregular on sides of face below antennae, on supraclypeal area and on clypeus; punctures of thorax very coarse and deep, close but not crowded, but scutellum coarsely rugoso-punctate or reticulate and with a quite distinct, median ridge; propodeum smooth, finely tessellate and rather dull laterally, posterior face more shining, dorsal area very poorly demarked; pubescence very short and inconspicuous, entirely pale, rather dense between antennae and eyes; scutum with a conspicuous, anterior, tomentose band which is slightly interrupted medially, posterior margin with a similar very narrow band; anterior and posterior margins of pleura with rather loose, white tomentose bands; transverse carinae of tubercles strongly elevated, yellowish-hyaline, not produced along anterior margin of scutum; hind margin of scutellum quite abrupt, with a distinct, posterior face; axillae strongly compressed and quite prominant, but length no greater than median length of scutellum (fig. 64); wings rather deeply infuscated except at extreme base, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to carinate, triangular tubercles; basal abdominal tergum with a rather conspicuous, basal, whitish fascia, an apical fascia evident at extreme sides, surface becoming reddish laterally; transverse grooves of terga 2-4 submedian in position, becoming obliterated medially, not at all fasciate; terga 2-5 with entire, transverse, apical, whitish fasciae that are somewhat narrowed medially; tergum 6 elongate, triangular in outline, tip narrowly rounded, with a low but distinct, median, longitudinal ridge to the tip, very slightly depressed on each side and slightly grooved on each side medially, but without lateral angles (fig. 65); sternum 6 with a pair of subapical, lateral notches; punctures of terga deep, distinct and only slightly separated in areas basad of the transverse grooves, and over entire basal tergum, areas apical to the grooves in large part impunctate, becoming very narrowly punctate along the apical margins, these abruptly and quite deeply depressed except in center; punctures of tergum 6 fine and quite uniformly close at base, becoming densely crowded and obscured toward tip; punctures of the sterna coarse, deep, distinct and quite close, those of sternum 5 becoming very fine and crowded toward the triangular tip.

MALE—Length 11-12 mm., black, the tegulae yellowish-hyaline, legs testaceous to ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, very slightly more distant from margin of vertex; cheeks above much narrower than eyes, becoming still narrower below, inferior angle and hypostomal carinae densely short pubescent, obscuring the surface; clypeus flat, apical margin straight; mandibles appearing bidentate, the middle tooth poorly developed; median length of labrum somewhat greater than basal width; punctures of vertex coarse, deep and distinct, well separated but not sparse, becoming somewhat more shallow and vague on cheeks, crowded and irregular below ocelli, and largely obscured on face by dense, appressed, yellowish pubescence; thoracic punctures very coarse, close and deep, distinct in large part, but very coarse and crowded on scutellum, this with a distinct median, shining ridge; pleura somewhat shining and rather smooth, posterior face more tessellate, with minute, scattered, vague punctures, dorsal area somewhat shining but velvety, entirely impunctate, upper margin quite coarsely and conspicuously but narrowly striate; transverse carina of tubercles erect and conspicuous but not produced along anterior margin of scutum; scutellum rather narrow, hind margin abrupt, nearly straight; axillae strongly compressed, strongly protruding beyond hind margin of scutellum, maximum length somewhat greater than median length of scutellum; wings rather deeply infuscated except at extreme base, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines short but robust and well developed, densely pubescent along anterior outer side; basal abdominal tergum obscurely carinate, this with a thin fringe of elongate, pale hairs, apical margin white fasciate, punctures deep, distinct, rather coarse and close; terga 2-5 with transverse, submedian, shining, impunctate bands, the punctures coarse and rather densely crowded both before and behind these areas, apical margins with nearly complete, whitish, apical fasciae, terga 5 and 6 fasciate at base laterally; tergum 6 narrowly and deeply excavated just before tip medially, dorsal projections short and rounded, lateral angles prominant and acute, and ventral, apical spines elongate-triangular and quite slender, much exceeding the dorsal projections; sterna 1-3 rather broadly but shallowly depressed apically, these margins yellowish-hyaline and more or less fasciate; sternum 4 with a deep, rounded, median emargination, delimited on each side by a slender, spine-like projection which barely attains the apical margin of the depressed, hyaline rim; gonocoxites of genital armature strongly compressed, not much exceeding penis valves, bearing rather fine, elongate, evenly distributed, white hairs.

DISTRIBUTION—Texas to North Carolina and Florida; April to November.

FLOWER RECORDS—*Afzelia, Bidens, Cephalanthus, Erigeron, Eryngium, Helenium, Heterotheca, Melilotus, Pycnanthemum* and *Solidago.*

Coelioxys atlantica new species
(Fig. 65)

FEMALE—Length 12 mm.; black, tegulae yellowish-hyaline, legs beyond trochanters ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; cheeks considerably narrower than eyes, narrowed and angulate below; clypeus very slightly convex, apical margin nearly straight, fringed with rather short, dense, pale pubescence; median length of labrum somewhat greater than basal width; median tooth of mandible well developed; punctures coarse and deep, slightly separated across vertex, cheeks more rugose, and face below ocelli coarsely rugose, becoming finely so on supraclypeal area and on clypeus; pubescence of head and thorax entirely pale, slightly yellowish, short and subappressed over much of face, somewhat more copious around antennae and along sides of face, very thin and short on clypeus and supraclypeal area, thin and whitish on cheeks, becoming rather elongate and dense below; mesosternum densely white tomentose medially, pubescence becoming relatively thin on pleura above, with loose but rather distinct, whitish, anterior and posterior fringes; scutello-mesothoracic suture rather densely pale tomentose, scutum with a pair of tranverse, anterior lines of tomentum that are subinterrupted medially, being connected by a few scattered, scale-like appressed hairs; posterior face of scutellum densely tomentose; pubescence of propodeum more erect and elongate, thin, entirely whitish; transverse carina of tubercles erect and conspicuous, yellowish-hyaline, projecting slightly along anterior margin of scutum; posterior margin of scutellum very slightly outcurved, the posterior and dorsal faces quite distinct but the line of disvision not carinate; axillae slender and elongate, tips reaching considerably beyond hind margin of scutellum; coxal spines short but rather distinct, broad and carinate at base, with a slender acute tip, densely pubescent posteriorly; wings subhyaline basally becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum somewhat shining between coarse and deep punctures, these slightly separated medially, becoming very close, almost crowded, laterally and anteriorly; scutellum rather coarsely reticulate; axillae somewhat more finely reticulate; pleura shallowly reticulate, becoming somewhat more coarsely so above; lateral faces of propodeum rather smooth but dull, densely tessellate, posterior face dull, with numerous fine and rather close punctures, dorsal area smooth but velvety, becoming irregularly striate along upper margin; basal abdominal tergum shining, punctures rather coarse, deep and distinct, well separated over most of disc, but becoming closer at extreme sides where the disc is rather densely white pubescent, punctures becoming very fine and close along the depressed apical rim, this with a complete, dense whitish fascia; terga 2 and 3 with complete, narrow and deep, transverse grooves which are basal toward the sides, but more median in position at center, the more basal punctures coarse, deep and quite regularly close, disc beyond the groove largely impunctate, with only a few, irregular scattered punctures medially, but becoming rather closely punctate at extreme sides, apical margins depressed, with entire, dense, whitish fasciae; tergum 4 with a shallow, transverse groove which is obliterated medially, punctures toward base quite coarse, rather close and deep, those toward apical margin sparse and irregular, becoming somewhat closer at extreme sides, apical margin depressed, completely, densely, white fasciate; tergum 5 rather sparsely punctate in general, apical margin with a complete, dense, whitish fascia; tergum 6 rather broad basally, rather abruptly narrowed at mid point and thus with lateral, obtuse angles evident, the apical portion narrowly triangular, tip narrowly rounded, basal portion very regularly, deeply and quite coarsely and closely punctate throughout, with a narrow, longitudinal, median, raised line which continues as a distinct ridge to the apex, surface rather deeply excavated on each side of this toward apex, and lateral margins deeply grooved (fig. 65); sternum 5 rather broad at base, narrowed toward apex, with a pair of distinct, lateral notches toward the tip, this part much longer than breadth at the notches, narrowly acute; sterna 1-4 somewhat shining, coarsely, deeply, quite closely and regularly punctate, apical margins slightly depressed, yellowish-hyaline, rather densely white fasciate; sternum 5 rather coarsely and closely punctate across base, angulate apically, apical portion very finely roughened, margin with a dense, whitish fascia to the tip.

MALE—Length 10 mm.; black, tegulae and legs largely brownish-ferruginous; eyes rather strongly convergent below; lateral ocelli slightly nearer margin of vertex than to eyes, and slightly nearer each other than to margin of vertex; cheeks very slightly narrower than eyes, subcarinate posteriorly, with a bare, deeply concave and elongate area below which has a marginal fringe of dense, whitish pubes-

cence; clypeus nearly flat, apical margin nearly straight, entire surface densely covered with whitish pubescence which obscures the surface; median length of labrum about equal to basal width; middle tooth of mandible about equidistant from apical and inner teeth; punctures quite coarse, deep and distinct, well separated across vertex, becoming sparse just back of lateral ocelli and toward upper margin of eye, cheeks becoming somewhat more finely and closely punctate below, face finely and densely rugose beneath the dense pubescence; pubescence of face and cheeks white, that on cheeks short and thin; pleura with marginal fringes of whitish hairs, scutum with sparse whitish pubescence, largely covered with fine, erect, pale pubescence; transverse carinae of tubercles low, largely obscured by a fringe of white hairs; posterior margin of scutellum nearly straight, posterior face rather sharply delimited from dorsal face, rather densely pubescent; axillae quite robust, acute apically, projecting quite conspicuously from sides of scutellum; coxal spines elongate, somewhat flattened, narrowly rounded apically, densely pubescent posteriorly and laterally; wings subhyaline basally, becoming faintly infuscated apically, 1st recurrent vein reaching 2nd submarginal cell slightly nearer base than 2nd does to apex; scutum very coarsely, closely and deeply punctate, punctures nearly contiguous throughout, becoming somewhat finer and more dense laterally; scutellum and axillae rather coarsely rugoso-punctate; pleura with rather shallow but coarse, contiguous punctures; lateral faces of propodeum dull, posterior face somewhat more shining, with rather close, minute, obscure punctures, dorsal area rather broadly velvety, becoming narrowly rugosostriate along upper margin; basal abdominal tergum shining but closely and deeply punctate, apical margin somewhat depressed, with an entire whitish fascia; terga 2 and 3 with entire, deep and distinct, transverse grooves, punctures basad of the grooves deep, distinct, quite coarse but close and regular, the punctures beyond the grooves more irregular, not quite so close medially where the surface is shining, becoming finely and densely rugose just behind the short but distinct foveae, apical margins of these terga densely white fasciate; terga 4-6 more or less densely fasciate at base, 4 with an apical, dense, whitish fascia which is somewhat narrowed medially, punctures quite coarse, deep and distinct, slightly but not widely separated medially; surface of tergum 6 very closely, deeply and finely punctate, a deep, median excavation just before tip, dorsal protuberances short, divergent, narrowly rounded, ventral spines more slender and elongate, lateral spines well developed, subacute; sterna 1-4 shining, with coarse, deep and quite uniformly close punctures, apical margins rather deeply depressed, densely white tomentose, forming conspicuous fasciae; disc of sternum 4 not emarginate medially, depressed rim without a conspicuous, median emargination; sternum 5 largely retracted, apical margin nearly straight; sterna 6 and 8 entirely retracted; gonocoxites only slightly exceeding penis valves, rather broadly compressed, with scattered and rather conspicuous, elongate hairs.

TYPES—Holotype: Female, Wake Co., N. C., June 22, 1957 (Mitchell) [author's coll.]. Allotype: Sagamore, Mass. (J. Bequaert) [M. C. Z.]. Paratypes: MASSACHUSETTS: 5 ♀♀, Sagamore. (Bequaert); 3 ♂♂, Lynn, July 10 & 12, 1901 (Davis); 1 ♀, Needham, June 24, 1921, 1 ♀, 1 ♂., Forest Hills, July 20, 1926 and August 20, 1927 (both Mitchell); 1 ♂, Dorchester, July 5, 1909 (Bolster); 1 ♀, Provincetown (A. P. Morse); 1 ♀, Forest Hills, July 31, 1901; 1 ♂, no data. NORTH CAROLINA: 1 ♀, Raleigh, May 16, 1948 (Mitchell). NEW YORK: 1 ♂, Port Ontario, June 27, 1955; 1 ♀, Six-mile Creek, Ithaca, August 27, 1958 (both H. E. Evans). MARYLAND: 1 ♂, Baltimore, July, 1909 (F. E. Blaisdell). ILLINOIS: 1 ♀, 2 ♂♂, Chicago, July 15, 1899. MICHIGAN: 3 ♀♀, Midland Co., June 24, July 8 and 11, 1937-1944; 3 ♀♀, 1 ♂, Huron Co., July 11, 1941 and 1948; 1 ♀, Gladwin Co., July 7, 1935; 1 ♂, Clare Co., June 24, 1936; 1 ♀, Delta Co., July 2, 1955 (all Dreisbach); 1 ♀, Oakland Co., July 7, 1927 (A. W. Andrews); 1 ♀, E. S. George Reserve, Livingston Co., August 1, 1957 (F. C. Evans). NEBRASKA: 1 ♀, Omaha, August 1, 1948 (Dreisbach). CONNECTICUT: 1 ♂, Colebrook, August 3, 1921. MINNESOTA: 1 ♀, Mankato, June 23, 1913; 1 ♀, Washington Co., July 11, 1921. INDIANA: 1 ♀, Cass Co., September 10, 1953. FLORIDA: 1 ♂, Lk. Butler, April 14, 1931. ONTARIO: 1 ♀, Point Pelee, July 26, 1920. MANITOBA: 1 ♀, Aweme, August 20, 1914. (N. Criddle). QUEBEC: 1 ♀, Ile Perrot, August 25, 1956 (A. & H. Dietrich).

Paratypes are in collections of the Museum of Comparative Zoology, Cornell University, Purdue University, the Canadian Department of Agriculture, the University of Minnesota, the University of Rhode Island, the U. S. National Museum, the Florida Plant Board, U. N. Lanham, R. R. Dreisbach and the author.

This female is very similar to *8-dentata*, the chief difference being the markedly angulate sides of tergum 6. Another apparently constant difference is the much more narrow and elongate tip of the 6th sternum beyond the lateral notches. The description of the male is based on three specimens having the same collection data as females. They, also, bear a strong resemblance to *8-dentata*, the chief difference being the closer puncturation of the vertex in *atlantica*.

Coelioxys comstockii Cresson
(Fig. 65)

Coelioxys comstockii Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 96. ♀.

FEMALE—Length 13 mm.; black, tergum 1 somewhat reddened; eyes convergent below; lateral ocelli subequally distant from margin of vertex and each other, more distant from eyes; cheeks about half width of eyes, shallowly grooved below; clypeus slightly convex; apical margin with a short, dense fringe hiding the edge; mid mandibular tooth slightly nearer apical than to inner tooth; punctures deep and close over entire head and thorax, except for finer contiguous punctures on clypeus and supraclypeal area, finer and densely crowded on scutum laterally, coarse and contiguous medially and on scutellum, more distinct on pleura; scutellum somewhat outcurved, upper and posterior surfaces indistinct; axillae slender and elongate; pubescence pale ochraceous, dense on face, but clypeus and vertex very thinly pubescent, dense and more elongate around tubercles and back of wing bases, more whitish on cheeks and pleura; coxal spines very short, triangularly acute; wings subhyaline basally, lightly infuscated apically, veins brownish-testaceous; basal concavity of tergum 1 subcarinate but not fasciate; terga 2 and 3 with distinct transverse grooves, these narrowly obliterated at center, submedian in location at mid-line, becoming basal at each side, punctures sparse over apical area toward mid-line, becoming close at extreme sides and toward apical margin which is only slightly depressed; tergum 4 not distinctly grooved but with a corresponding depressed area rather sparsely punctate, tergum 5 more flattened and much more finely punctate; terga 1-5 with dense, whitish, apical fasciae, that on 5 less evident; tergum 6 slightly angulate on each side, apical half triangular in outline, shallowly grooved on each side toward angle, not carinate medially, apex narrowly truncate (fig. 65); sternum 6 strongly narrowed apically, minutely notched toward tip, median length of this area somewhat greater than width at the notches; sterna 1-4 closely and deeply punctate, white fasciate apically; sternum 5 triangular apically, narrowly fasciate, deeply punctate across base, becoming dull and impunctate toward apical margin.

DISTRIBUTION—New York.

This species remains to be rediscovered, for no specimens have been collected nor any found in any of the collections received for study. The holotype is in the Philadelphia Academy of Science.

Coelioxy dolichos Fox
(Figs. 64-66)

Coelioxys dolichos Fox, 1890. Ent. News 1, p. 107. ♀.

FEMALE—Length 15 mm., entirely black, the tarsi becoming more or less brownish; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, slightly more distant from eye; cheeks very much narrower than eyes, triangularly produced below; clypeus strongly convex, little if any produced apically, the margin somewhat thickened, very slightly outcurved; median tooth of mandibles low but distinct; median length of labrum slightly greater than basal width; vertex, interocellar area, and area below anterior ocellus largely shining and impunctate, with only a few scattered punctures; vertex with a single row of punctures along margin; supraclypeal area with coarse, deep and well separated punctures, the clypeus more finely and sparsely punctate medially, somewhat more closely at extreme sides; cheeks subcarinate posteriorly, with scattered, irregular, but deep and distinct punctures; median area of scutum largely shining and impunctate, with only a very few, widely scattered, rather fine punctures, these becoming closer, more coarse and deep around lateral and anterior margins; scutellum flattened, triangularly produced posteriorly, shining and impunctate medially, with a few, scattered punctures at each extreme side; axillae elongate-triangular, produced considerably beyond lateral limits of scutellum, with only a few, scattered, fine punctures (fig. 64); pleura closely and deeply punctate just below tegulae, but quite sparsely punctate below; lateral faces of propodeum very dull, finely and densely tessellate, posterior face tessellate, with some minute, vague and indistinct punctures barely evident, dorsal area rather smooth but densely tessellate, becoming irregularly rugosostriate along upper margin; pubescence very short, white, quite dense along sides of face, hind border of eyes, around tubercles, and

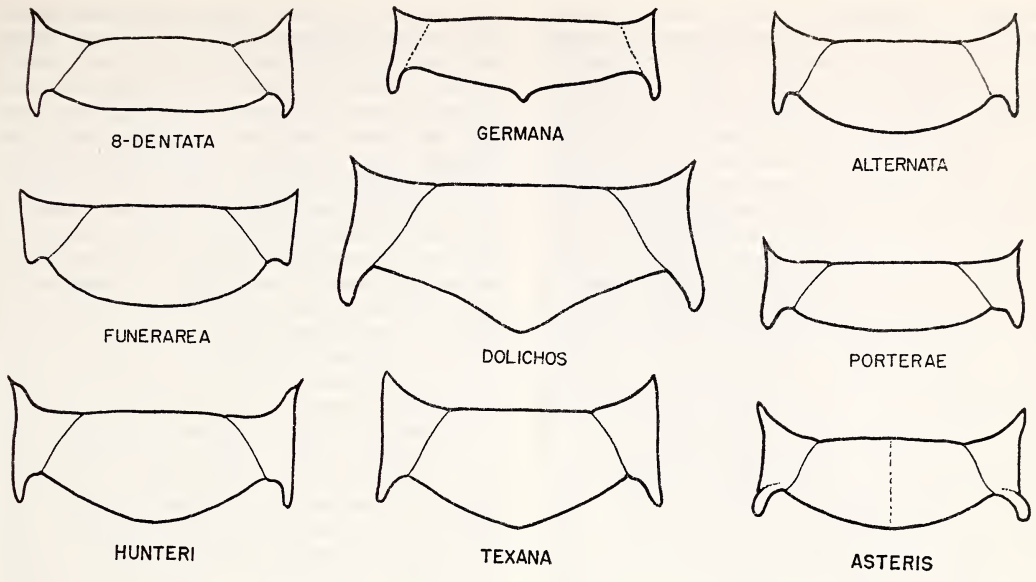


Figure 64—Scutellum and axillae in species of *Coelioxys*.

along anterior and posterior borders of pleura, quite dense along lateral margins of propodeum and across posterior face dorsally; transverse carinae of tubercles conspicuous and erect, extending but very slightly along anterior margin of scutum; wings deeply infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to very short, acute tubercles; transverse grooves of abdominal terga evident only toward sides, sub-basal in position, entirely obliterated medially, very closely and deeply punctate, the area beyond very sparsely, coarsely and deeply punctate, apical margins abruptly but very narrowly depressed, with white, apical fasciae which are quite dense and conspicuous at each extreme side, becoming thin and inconspicuous medially on the more basal terga, widely separated on the more apical terga; tergum 6 shining, finely and sparsely punctate in large part, becoming somewhat more closely punctate across base, narrowed apically, lateral margins slightly incurved just before the subtruncate apex, with a median, longitudinal carina, deeply excavated on each side of this near tip (fig. 65); sternum 6 narrow, projecting slightly beyond 6th tergum, with a distinct, median, longitudinal carina, which projects slightly beyond apex as a triangularly pointed tubercle; sterna 1-4 coarsely and deeply punctate, rather sparsely so medially, becoming quite close laterally, apical margins rather broadly depressed, becoming yellowish-hyaline toward rims; sternum 5 more narrowly rounded apically, punctures relatively close.

MALE—Length 11-12 mm.; entirely black; eyes slightly convergent below; lateral ocelli subequally distant from eyes and each other, slightly more distant from margin of vertex; cheeks very narrow, subcarinate posteriorly, terminated by an obtuse angle below, above which it is rather deeply excavated, margins of the hypostome strongly carinate; clypeus slightly convex, apical margin nearly straight, with a dense fringe of elongate, yellowish pubescence; median mandibular tooth strongly developed; median length of labrum slightly greater than basal width; vertex and area between eyes and ocelli shining, sparsely punctate, becoming rather abruptly, coarsely, rugoso-punctate just below anterior ocellus, the supraclypeal area very finely rugose but densely pubescent; exposed area of clypeus shining and sparsely punctate; cheeks closely, coarsely and deeply punctate; scutum shining and largely impunctate medially, becoming rather coarsely and deeply but still sparsely punctate laterally and anteriorly; scutellum shining, largely impunctate with only a very few deep punctures at extreme sides and along posterior margin, broadly, triangularly produced posteriorly, overhanging the metanotum; axillae prominant, elongate-triangular, produced considerably beyond lateral margins of scutellum, rather sparsely punctate and shining; transverse carina of tubercles erect and conspicuous, extended somewhat along anterior margin of scutum; pubescence of face strongly yellowish, dense on each side of clypeus and quite dense over median area of face, thin and whitish on cheeks, forming a

whitish fringe along anterior and posterior margins of pleura, and quite dense on propodeum posteriorly; wings deeply infuscated, 1st recurrent vein nearly or quite interstitial with 1st transverse cubitus, the 2nd reaching 2nd submarginal cell near but not at the tip; coxal spines reduced to narrowly rounded tubercles; transverse grooves of abdominal terga 2-5 evident only by markedly depressed, closely punctate, basal areas toward sides, the apical half of these discs more sparsely, coarsely and deeply punctate, median areas of all shining, very sparsely and finely punctate, apical margins narrowly depressed, white fasciate toward sides of 2-5, but these widely interrupted medially, basal tergum with a complete, dense, white, apical fascia which becomes much narrowed medially; tergum 6 shining, sparsely and minutely punctate medially, but punctures becoming somewhat more coarse, close and deep at extreme sides, somewhat deeply excavated medially toward apex, the dorsal protuberances elongate and spine-like, rather strongly divergent, the ventral spines slender, considerably exceeding the dorsal spines, and lateral spines quite slender and elongate (fig. 66); abdominal sterna shining, sparsely and finely punctate medially, but punctures becoming quite coarse, close and deep at extreme sides; sternum 5 fully exposed, outcurved apically, punctures rather fine but somewhat closer medially, becoming quite close toward extreme sides; sterna 6-8 entirely retracted; gonocoxites of genital armature somewhat compressed, barely exceeding the penis valves in length, bearing a few, rather sparse, elongate hairs toward apex.

DISTRIBUTION — North Carolina to Florida; March to November.

FLOWER RECORDS — *Bidens, Borrichia, Flaveria, Gaillardia, Ilex, Itea, Rhus, Senecio* and *Solidago.*

HOST—K. V. Krombein has reared *dolichos* from nests of *Megachile xylocopoides.*

Coelioxys producta Cresson from Cuba bears a strong resemblance to *dolichos,* differing chiefly in having red legs. Possibly these two should be considered to be only subspecifically distinct, but no intermediates have been seen. Additional records from the West Indies, along with host records, may give a clue to their relationship.

Coelioxys floridana Cresson

(Fig. 66)

Coelioxys floridana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 98. ♂.

MALE—Length 12 mm.; black, tegulae testaceous-hyaline, legs largely brownish-testaceous; eyes slightly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; cheeks slightly narrower than eyes, subcarinate posteriorly, lower margin shallowly excavated, shining and impunctate; clypeus nearly flat, margin nearly straight, with a few, low, obscure crenulations; median tooth of mandible low and inconspicuous; median length of labrum somewhat greater than basal width; vertex and area between eyes and ocelli shining, punctures coarse and close but hardly sparse, face below ocelli becoming abruptly, coarsely rugose, very finely subrugose below antennae beneath the dense pubescence, clypeus rather finely and irregularly rugose; punctures of cheeks shallow, irregular and rather obscure, quite coarse in general; transverse carinae of tubercles well developed, strongly produced at upper end, slightly overlying anterior margin of scutum; hind margin of scutellum nearly straight; axillae elongate triangular, protruding much beyond margin of scutellum; punctures coarse and deep but distinct over most of scutum, becoming contiguous at extreme sides and across anterior margin, scutellum with similar but somewhat closer punctures, pleura very coarsely rugoso-punctate beneath tegulae, doubly punctate beneath this, with very large, shallow, well separated punctures, between which there are numerous, fine, scattered punctures; lateral and posterior faces of propodeum dull and densely tessellate, punctures hardly evident, dorsal area smooth and tessellate, becoming irregularly but rather coarsely rugose along upper margin; pubescence whitish, rather elongate and dense on face and clypeus, white and very short but rather dense on cheeks, the hypostomal area with a dense brush of short pubescence; anterior and posterior margins of pleura with a loose, whitish fringe, scutum with a transverse, anterior, tomentose line which is interrupted medially, and scutello-mesothoracic suture with a very narrow, dense line of tomentum; propodeum with rather elongate, thin, whitish pubescence posteriorly and along posterior margins of lateral faces; wings lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines reduced to triangular, carinate tubercles which are densely fringed posteriorly; transverse grooves of terga 2-4 sub-basal in position, entirely obliterated medially, closely and deeply punctate toward basal margin, but the more apical margin rather broadly impunctate, but disc becoming closely punctate just before the abruptly depressed apical rims, median areas of all terga very sparsely and finely punctate, rims more or less yellowish-hyaline; terga 1-5

with whitish, apical fasciae that are usually entire but somewhat narrowed medially, basal grooves of 4 and 5 also white fasciate, and 6 with a fasciate band across extreme base; tergum 3 with a pair of deep, rounded foveae just posterior to the end of each lateral groove; tergum 6 shining, finely and quite sparsely punctate, very deeply excavated toward tip, the dorsal protuberances triangular, narrowly rounded apically, rather short, the ventral pair elongate, acute, rather strongly compressed, lateral spines well developed (fig. 66); sterna 1-4 with coarse, deep and quite close punctures, apical margins of 2-4 rather abruptly and narrowly depressed, quite strongly white fasciate, 4 somewhat triangular in form, disc with a deep, median emargination lying just above the depressed, testaceous rim which is also shallowly emarginate medially; sternum 5 largely hidden, margin very shallowly incurved and submembraneous; sterna 6 and 8 entirely retracted; tergum 7 largely hidden, rounded, not at all acute medially; gonocoxites of genital armature rather slender, with only scattered, erect, somewhat elongate hairs, slightly exceeding the penis valves in length.

DISTRIBUTION — North Carolina to Florida; July.

Coelioxys funerarea Smith

(Figs. 64-66)

Coelioxys funerarea Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 272. ♂.

Coelioxys lateralis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 405. ♂. New synonymy.

Coelioxys lucrosa Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 97. ♀. New synonymy.

Coelioxys lateralis Cockerell, 1921. Amer. Mus. Novitates 21, p. 5. ♂.

Coelioxys lucrosa Graenicher, 1927. Ent. News 38, p. 233. (biology)

Coelioxys lucrosa Medler, 1958. Canad. Ent. 90, p. 326. (host)

Coelioxys lucrosa Medler and Koerber, 1958. Ent. Soc. Amer. Ann. 51, p. 343. (biology)

FEMALE — Length 12-16 mm.; entirely black, including tegulae and legs; eyes very slightly convergent below; face broad, distance between eyes above nearly equal to median length; lateral ocelli considerably nearer to each other than to eyes, separated from margin of vertex by about their own diameter; cheeks considerably narrower than eyes, somewhat excavated below just before inferior angle, this area pubescent; clypeus slightly convex, not much produced apically, margin slightly outcurved, densely covered with rather short, ochraceous pubescence; mandibles angulate medially as seen from above, the median tooth small but distinct; median length of labrum somewhat greater than basal width; punctures rather coarse and deep, well separated on vertex between eyes and lateral ocelli, but close between and below ocelli; cheeks rather coarsely rugose; face below antennae rugose, clypeus very finely so, pubescence of head and thorax entirely pale, more or less yellowish and quite copious around antennae, on sides of face below, short and rather copious on cheeks below and on thorax laterally and posteriorly; transverse carinae of tubercles very low and inconspicuous, barely evident; scutellum rather evenly outcurved posteriorly, posterior face quite abrupt; axillae very short, posterior angle barely evident (fig. 64); scutum shining, deeply and distinctly punctate, punctures well separated over the broad, median area, but becoming quite close and somewhat finer between notaulices and tegulae; scutellum more finely punctate, punctures contiguous; axillae shining and more sparsely punctate; pleura somewhat shining between rather close, shallow but uniform punctures, these becoming very close just below tegulae; propodeum dull but rather smooth, punctures exceedingly minute but quite close, dorsal area of posterior face more velvety below, becoming very obscurely substriate along upper margin; wings subhyaline, becoming somewhat clouded along apical margin and in marginal cell, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; coxal spines represented by very low, subcarinate tubercles; transverse grooves of median abdominal terga very shallow, barely evident, entirely obliterated medially, terga shining and sparsely punctate medially, but somewhat more finely and closely punctate across basal third of each one, the apical third very sparsely punctate, apical margins narrowly but quite deeply depressed at each extreme side, becoming quite flat medially, the depressed margins densely white fasciate at extreme sides, these becoming very narrow and indefinite medially; basal tergum with a dense patch of white pubescence at each extreme side; tergum 6 subtriangular in outline, slightly incurved toward the narrowly rounded tip, with a very faint and indefinite, median ridge extending from near the base nearly to the tip, surface shining, finely and quite closely punctate, but the punctures obsolescent toward the narrowed tip (fig. 65); sternum 6 narrow and elongate, much longer than the tergum, obscurely notched on each side near the tip, width at the notches slightly less than distance to the apex; sterna 1-4 shining, punctures well separated medially, becoming very close laterally, rather deep and distinct, apical margins very narrowly and slightly depressed, more or less hyaline and with narrow, white fasciae; sternum 5 tri-

angularly produced apically, punctures fine but fairly distinct toward base and at extreme sides, but disappearing toward the apex medially, apical margin quite conspicuously fasciate.

MALE—Length 9-12 mm.; entirely black, including tegulae and legs; eyes convergent below; lateral ocelli subequally distant from each other and margin of vertex, much more distant from eyes; cheeks nearly equal to eyes in width, subcarinate posteriorly, with a shining, shallow, excavated area below, densely pubescent between this and the hypostome; clypeus very slightly convex, apical margin nearly straight, densely pubescent, obscuring the surface; median tooth of mandibles conspicuous; median length of labrum about equal to basal width; punctures deep and rather coarse, close over most of vertex, cheeks becoming more rugose, and face below ocelli dull and densely, coarsely rugose above antennae, becoming very finely so below; pubescence entirely pale on head and thorax, more or less yellowish on front of face, copious and more whitish on cheeks below and on thorax laterally and posteriorly, rather thin on dorsum, dense and white on sternum; transverse carina of tubercles barely evident, very low and inconspicuous; scutellum slightly outcurved, posterior margin not abrupt; axillae very short, broadly triangular, apex barely produced beyond margin of scutellum; coxal spines well developed, more or less spatulate, with rounded apex, quite densely pubescent, especially posteriorly; wings subhyaline, becoming faintly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; transverse grooves of abdominal terga 2 and 3 quite deep and distinct laterally, obliterated medially, punctures in the grooves close and rather fine but distinct, apical margin of the groove on tergum 2 with a deep, somewhat elongate fovea on each side, apical margin of this fovea narrowly impunctate, median punctures of all terga quite sparse, surface shining, punctures becoming closer toward sides, densely crowded between foveae and apical margin on 2, margins of all quite abruptly depressed toward sides but less so toward median line, brownish-hyaline, densely white fasciate laterally, but rather widely interrupted medially; dorsal, apical projections of tergum 6 spinelike, rather elongate but narrowly rounded apically, surface quite deeply excavated between these, ventral spines narrow and elongate, about parallel, lateral spines quite slender and elongate (fig. 66); abdominal sterna 1-4 somewhat shining, rather finely punctate, punctures well separated medially, becoming closer toward sides, apical margins narrowly brownish-hyaline and narrowly pale fasciate, apical margin of 4 not emarginate medially; sternum 5 largely retracted, apical margin barely evident, broadly outcurved, the median area straight; sterna 6 and 8 entirely retracted, 8 slightly narrowed apically, with narrowly truncate apex; penis valves fully equalling gonocoxites in length, the gonocoxites copiously long pubescent.

DISTRIBUTION—Yukon Territory and British Columbia to Nova Scotia, South to Illinois and Pennsylvania, with one record in Georgia; May to September.

HOSTS — *Megachile inermis* Prov., *M. relativa* Cress., and *M. frigida* Sm.

Coelioxys galactiae new species

(Figs. 65 & 66)

FEMALE—Length 10 mm.; black, tegulae testaceous, legs and abdominal sterna ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly nearer each other than to eyes; cheeks much narrower than eyes, somewhat narrowed below, inferior angle obscured by dense pubescence, this area not excavated; clypeus flat, apical margin about straight, with a rather dense fringe of moderately long, yellowish pubescence; median length of labrum slightly greater than basal width; mandibles distinctly 3-dentate, median tooth approximate to the apical tooth; punctures rather deep and distinct, irregular in size and distribution, but rather close across vertex, cheeks rather irregularly rugoso-punctate beneath the pubescence, face below ocelli quite closely punctate, supraclypeal area rather shallowly and coarsely rugoso-punctate, surface at sides of face obscured by dense, subappressed pubescence, clypeus finely and irregularly rugose beneath dense, appressed tomentum; pubescence entirely pale, more or less yellowish around antennae and over face and clypeus, more whitish, quite short and decumbent on cheeks; ventral surface of mesothorax densely white tomentose, obscuring the surface, becoming thinner above but with rather dense anterior and posterior fringes, copious around tubercles, propodeum with more erect, elongate, whitish pubescence; transverse carinae of tubercles erect and conspicuous, testaceous-hyaline, extending somewhat along anterior margin of scutum; posterior margin of scutellum only slightly outcurved, posterior and dorsal faces not sharply differentiated; axillae acute, projecting conspicuously from sides of scutellum, length somewhat greater than median length of scutellum; coxal spines reduced to triangular, subcarinate tubercles which are densely pubescent posteriorly; wings

subhyaline, faintly infuscated along outer margin, 2nd recurrent vein reaching 2nd submarginal cell somewhat nearer apex than 1st does to base; scutum somewhat shining between quite coarse and deep punctures, these rather widely separated on each side of center, becoming somewhat finer and closer medially and along sides; punctures of scutellum scattered and irregular, with some rather broad, intervening spaces; punctures of axillae very close and coarse, becoming more reticulate; punctures of pleura rather shallow but coarse and very close in large part, area below tegulae more reticulate; lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with rather close, minute and vague punctures beneath the thin, elongate pubescence, dorsal area velvety, becoming quite distinctly and rather coarsely striate along upper margin; basal abdominal tergum shining, punctures quite coarse, close along margin of the concavity, but otherwise rather sparse, the extreme sides densely tomentose and apical margin with a complete, dense, whitish, apical fascia; terga 2 and 3 with complete, transverse, but rather shallow grooves, these sub-basal at sides but becoming more subapical at center, the basal punctures quite coarse, close, regular and deep, the area apical to the groove very sparsely punctate medially, becoming somewhat more closely but coarsely and irregularly punctate at sides, apical margin slightly depressed, with entire, whitish, apical fasciae; terga 4 and 5 rather coarsely and sparsely punctate apically, punctures closer and finer toward base and somewhat closer at extreme sides, apical margins depressed and whitish fasciate; tergum 6 triangular, with a rather narrowly rounded tip, sides very slightly angulate at mid point, a low median ridge extending from near the base to the tip, surface quite deeply excavated on each side of this near tip, and sides rather deeply grooved from lateral angles toward tip, surface somewhat shining basally, with close and fine punctures, these becoming crowded apically, apex more densely rugose (fig. 65); sternum 6 broad basally, abruptly narrowed at apex, thus incurved at each side, the tip subtriangular, more or less acute; sterna 1-4 shining between coarse, close, deep and quite regular punctures, apical margins depressed and yellowish-hyaline, densely and rather loosely white fasciate; sternum 5 narrowly rounded or subtriangular in outline, basal area with rather coarse, sparse, scattered punctures, these becoming extremely minute and densely crowded over apical half, margin narrowly yellowish-hyaline, and fringed with whitish pubescence.

MALE—Length 11 mm.; black, tegulae testaceous-hyaline, legs and abdominal sterna largely ferruginous; eyes slightly convergent below; lateral ocelli very slightly nearer each other than to margin of vertex, somewhat more distant from eyes; cheeks considerably narrower than eyes, carinate posteriorly, with a shining, bare, concave, excavated area below, this fringed posteriorly with rather elongate, curved hairs; clypeus about flat, apical margin straight but obscured by dense pubescence; median length of labrum somewhat greater than basal width; median tooth of mandible distinct, approximate to apical tooth; punctures coarse and deep, rather close but distinct across vertex and between ocelli, becoming more rugose on cheeks, quite coarse, irregular and rather shallow below ocelli, entire face below antennae densely covered with appressed pubescence which completely hides the surface; pubescence of face yellowish, whitish and rather short and subappressed on cheeks, ventral surface of thorax densely white tomentose, completely hiding surface, becoming rather thin and more erect on pleura above, scutello-mesothoracic suture with very fine, pale pubescence, and anterior margin of scutum with a pair of transverse, rather widely separated lines of whitish pubescence; pubescence of propodeum thin, elongate and erect, entirely whitish; transverse carinae of tubercles erect and quite conspicuous, more or less testaceous-hyaline but somewhat obscured by a fringe of pubescence, extending somewhat along anterior margin of scutum; hind margin of scutellum very slightly outcurved, posterior and dorsal faces not differentiated; axillae acute apically, projecting conspicuously from sides of scutellum, somewhat longer than median length of scutellum; front coxal spines robust and well developed, somewhat spatulate, with rounded tips, densely pubescent posteriorly and along inner sides; wings subhyaline becoming somewhat more deeply infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse and rather deep, somewhat irregular, slightly separated on each side of mid-line but becoming close laterally, finer anteriorly; punctures of scutellum irregular, much like those of scutum, to some degree separated; axillae very coarsely, contiguously punctate, almost reticulate; pleura irregularly and rather closely punctate, punctures rather shallow, more definitely reticulate above; lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with very minute, widely scattered, obscure punctures, dorsal area velvety, becoming rather narrowly and coarsely striate along upper margin; basal tergum shining between coarse, close and deep punctures, these quite regularly distributed, surface obscured by a narrow patch of dense tomentum at each extreme side, apical

margin with a complete, dense, whitish fascia; terga 2 and 3 with deep, distinct and complete transverse grooves, these sub-basal at extreme sides but more median in center, the more basal punctures coarse, close, deep and quite regular, apical portion of disc somewhat more irregularly and sparsely punctate medially, becoming more coarsely, closely and deeply punctate at sides, apical margins deeply depressed and with complete, dense, whitish fasciae; terga 4 and 5 densely white fasciate across the base, apical margins deeply depressed, fasciate only toward sides of 4, with only a trace on extreme sides of 5, surface somewhat shining, punctures coarse, deep and rather sparse at center, becoming closer laterally; tergum 6 densely tomentose across base, deeply excavated in center, the dorsal protuberances very short, broadly rounded and carinate, quite strongly divergent, ventral spines very short, subtruncate, the intervening space regularly rounded, lateral spines somewhat compressed, the tips rounded (fig. 66); sterna 1-4 somewhat shining between coarse, deep, regular and rather close punctures, apical margins depressed, yellowish-hyaline, quite densely whitish fasciate, that on 4 quite narrow; disc of sternum 4 very slightly emarginate apically, but the depressed rim also with a slight, median, apical emargination; sternum 5 largely hidden, apical margin broadly incurved, surface in general rather densely pubescent; sterna 6 and 8 entirely retracted, submembraneous; penis valves of genital armature quite robust, about equalling gonocoxites in length, the latter somewhat compressed, slightly dilated apically, bearing numerous, elongate and erect hairs toward apex.

TYPES — Holotype: Female, 10 mi. S. Lillington, N. C., June 23, 1937. Allotype: Topotypical [both author's coll.]. Paratypes: NORTH CAROLINA: 3 ♀♀, Lillington, July 7, 1938; 1 ♀, Hoffman, July 4, 1928; 1 ♂, Holly Shelter, Pender Co., June 8, 1950 (on *Amorpha*); 3 ♀♀, Topsail Isl., Aug 3, 1955 (on *Galactia*); 1 ♂, West End, Moore Co., June 14, 1950 (on *Asclepias tuberosa*); 1 ♂, Wilmington, June 20, 1952 (all Mitchell); 1 ♂, Salvo, Dare Co., Aug. 6, 1958 (K. V. Krombein). ILLINOIS: 1 ♂, Chicago, July 15, 1899 (Percy Gardner Bolster coll.). FLORIDA: 1 ♀, Gold Head Branch St. Pk., Clay Co., May-June, 1954 (L. H. Krombein). 5 ♂♂, Levy Co., July 13, 1954 (H. V. Weems, Jr., on *Eriogonum tomentosus*).

Paratypes are in the U. S. National Museum, the Museum of Comparative Zoology and the author's collection.

Coelioxys boharti new species

MALE—Length 12 mm.; black, tegulae more brownish-testaceous, legs obscurely reddened; eyes slightly convergent below; lateral ocelli slightly nearer eyes than to margin of vertex, and slightly nearer each other than to eyes; cheeks somewhat narrower than eyes, subcarinate posteriorly, with an elongate, bare, slightly concave area below which is conspicuously margined posteriorly by a fringe of elongate hairs, anterior margin with very short but dense pubescence; clypeus nearly flat, apical margin about straight, with a pair of fine rather widely separated tubercles, margin and surface with dense, whitish pubescence; median length of labrum about equal to basal width; median tooth of mandible distinct, approximate to the apical tooth; punctures quite deep and distinct but not very coarse, well separated across vertex, becoming quite sparse between ocelli and eyes, close and irregular on cheeks; median area of face just below anterior ocellus with scattered, irregular punctures on a rather smooth, somewhat elevated field, but remainder of face around and below antennae densely covered with appressed, pale yellowish pubescence which completely hides the surface; pubescence of cheeks above very short but subappressed, obscuring the surface; venter of thorax densely white tomentose, completely hiding surface, becoming partially exposed above, but with dense anterior and posterior fringes; scutello-mesothoracic suture with a short line of pale tomentum on each side of center, scutum with a pair of transverse, anterior lines of tomentum, and the lateral margins narrowly tomentose; pubescence of propodeum entirely pale, rather copious, erect and long; transverse carinae of tubercles erect and rather conspicuous, extended but very slightly along anterior margin of scutum, partially covered with short, dense pubescence; posterior margin of scutellum very slightly outcurved, posterior face rather distinct and densely tomentose; axillae robust, triangularly pointed apically, projecting conspicuously beyond margin of scutellum; front coxal spines well developed, compressed and somewhat spatulate, the tips rounded, densely pale pubescent posteriorly, and with some short, dense pubescence anteriorly; wings rather deeply infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse, deep and distinct, slightly and regularly separated over most of disc, but becoming close at extreme sides; punctures of scutellum dorsally coarse and close medially, becoming slightly separated laterally but still quite close, those of axillae somewhat finer but contiguous, becoming thus more reticulate; punctures of pleura rather shallow, coarse and ir-

regular, very close but not crowded below, becoming closer and more reticulate above; lateral faces of propodeum smooth but rather dull, posterior face somewhat more shining, with numerous, rather close but very minute and obscure punctures, dorsal area velvety, becoming rather coarsely striate across upper margin; basal tergum closely and deeply punctate throughout, punctures not very coarse, apical margin depressed and completely whitish fasciate, fascia becoming narrower medially, lateral margins of discs densely tomentose; transverse grooves of terga 2 and 3 submedian in center, becoming sub-basal at extreme sides, the more basal punctures quite regular, rather coarse, deep, distinct and well separated, the more apical punctures more irregular, rather widely separated at center, but becoming quite close at extreme sides, apical margins rather deeply depressed, completely whitish fasciate, disc of tergum 2 on each side with a narrow, transverse area of dense and fine punctures, which possibly represent foveae; tergum 4 thinly pale tomentose across base, apical margin deeply depressed and densely fasciate at the sides, this disappearing medially, surface shining, median punctures coarse, deep and rather sparse, becoming quite close laterally; tergum 5 densely tomentose across base, apical margin deeply depressed, fasciate only at extreme sides, disc shining, punctures rather well separated throughout; tergum 6 densely pale tomentose across base, deeply excavated at center, dorsal protuberances short, broadly rounded, subcarinate and divergent, ventral spines reduced to short, rounded protuberances which are markedly flattened, intervening space relatively shallow and rounded, lateral spines distinct and subacute; sterna 2-4 somewhat shining, punctures regular, deep, distinct and rather close throughout, apical margins depressed, yellowish-hyaline and densely white fasciate; disc of sternum 4 not emarginate medially, the depressed margin less conspicuously fasciate and with a narrow, but distinct, median emargination; sternum 5 largely hidden, apical margin submembraneous, nearly straight medially; sterna 6 and 8 entirely retracted, membraneous, 8 rather broadly rounded apically, without a conspicuous fringe; penis valves of genital armature relatively narrow at base, not much elongated, hardly equalling gonocoxites in length, these compressed, slightly dilated before the tip, but tips acuminate, apical half bearing numerous, erect and elongate hairs.

TYPE — Holotoype: Male, Cocoa, Fla., July 1944 (G. E. Bohart).

This male bears a strong resemblance to the male of *galactiae* but differs in the darker color of the legs, the broader vertex, and the appressed and scale-like pubescence of the pleura. Possibly it should be considered only subspecifically distinct from *galactiae*, but the female is needed before a positive opinion is justified.

Coelioxys germana Cresson

(Figs. 64-66)

Coelioxys germana Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 102. ♀.

Coelioxys germana Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE — Length 12 mm.; black, the tegulae testaceous-hyaline, legs brownish-testaceous, basal abdominal sterna more or less ferruginous; eyes somewhat convergent below; lateral ocelli subequally distant from eyes and each other, separated from margin of vertex by about their own diameter; cheeks very narrow, carinate posteriorly, angulate but not excavated below; clypeus very slightly convex, apical margin nearly straight, with a rather dense, apical fringe of pale pubescence; median tooth of mandibles conspicuous; median length of labrum not much exceeding basal width; punctures deep, distinct and quite coarse, close but distinct along narrow vertex, somewhat more sparse between ocelli, slightly separated below ocelli and over supraclypeal area, the clypeus very finely, closely and irregularly punctate, the punctures variable in size; punctures of cheeks obscured by dense pubescence; pubescence entirely pale, short and rather thin over median areas of face, but dense along inner margins of eyes and on cheeks; lateral faces of pleura with dense, white, anterior and posterior fringes, the scutello-mesothoracic suture with a quite dense fringe of more ochraceous tomentum, and scutum with a pair of anterior lines of whitish tomentum that are rather broadly separated medially, propodeum with rather thin and more elongate, whitish pubescence; transverse carinae of tubercles evident but not conspicuous; upper and posterior surfaces of scutellum not sharply differentiated, but hind margin with a conspicuous, median tubercle; axillae slender and elongate (fig. 64); coxal spines short but distinct, triangularly acute; punctures of scutum deep, distinct and quite coarse, distinctly but not widely separated in large part, somewhat closer between notaulices and tegulae; scutellum rather closely punctuate on each side of a shining median, impunctate area; punctures of axillae quite close but distinct; pleura shining and sparsely punctate below, between the marginal pubescent fringes, becoming closely punctate above just below tegulae; lateral faces of propodeum somewhat smoother, rather dull, very finely and obscure-

ly punctate, posterior face somewhat more shining, punctures minute and rather close, dorsal area more velvety, upper half becoming irregularly and finely rugoso-striate; wings subhyaline, becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; transverse grooves of abdominal terga 2-5 submedian in position, shallow but rather distinct, obliterated medially, discs rather closely but distinctly punctate between the grooves and base, sparsely punctate apically, apical margins rather abruptly but very narrowly depressed toward the sides, 1-5 with very narrow, dense, white, apical fasciae that are much narrowed or subinterrupted medially; tergum 6 subtriangular in outline, lateral margins very shallowly incurved just beyond mid point, apex very narrowly rounded, surface shining over basal half, closely, deeply and finely but quite regularly punctate, becoming dull, finely rugose toward apex, with a barely evident, median, raised line toward the tip (fig. 65); sternum 6 elongate-triangular, with a pair of deep and distinct, lateral notches toward the narrow, acute apex, this part nearly twice as long as width at the notches; basal tergum quite distinctly carinate at each side, lower surface ferruginous, sterna 1-4 shining, deeply, rather coarsely and closely punctate, punctures becoming somewhat closer at extreme sides, apical margins somewhat depressed, yellowish-hyaline, white fasciate; sternum 5 narrowly produced apically, basal half closely and deeply punctate, the punctures becoming minute and indefinite toward the rather acutely pointed tip.

MALE—Length 9.5-11mm.; black, the tegulae testaceous-hyaline, legs brownish-testaceous, abdomen more or less ferruginous beneath toward base; face rather narrow, eyes quite strongly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, very slightly nearer to each other; cheeks very narrow, carinate posteriorly, very deeply excavated below, this excavation polished and impunctate; clypeus very slightly convex, densely short pubescent, completely hiding the surface, apical margin apparently very slightly outcurved; median tooth of mandibles rather low but distinct; median length of labrum about equal to basal width; punctures coarse, deep and distinct, slightly separated on vertex behind ocelli, somewhat more sparse between ocelli and eyes and on vertex laterally, quite close on cheeks above, but obscured by pubescence; face below ocelli rather coarsely rugose, remainder of face entirely obscured by dense, whitish or yellowish pubescence; pleura densely fringed anteriorly and posteriorly with white pubescence, the scutello-mesothoracic suture with a narrow but dense, ochraceous line of tomentum, and scutum anteriorly with a pair of transverse, tomentose, ochraceous lines which are rather widely separated medially, propodeum with more elongate, thin, pale pubescence; transverse carinae of tubercles distinct but not conspicuous; posterior margin of scutellum with a distinct, median, triangular tubercle; axillae elongate and slender; coxal spines well developed, slender and elongate, densely fringed with white pubescence posteriorly; scutum and scutellum shining between distinctly but not widely separated punctures, these becoming somewhat closer laterally, each axilla with a few distinctly separated punctures; lateral faces of propodeum rather dull, but smooth, posterior face more shining, minutely and rather closely punctate, dorsal area smooth but velvety, upper portion becoming rather narrowly, irregularly rugoso-striate; transverse grooves of abdominal terga 2 and 3 deep and distinct laterally, where they are submedian in position but oblique in orientation, obliterated medially, punctures rather close between these grooves and the base, apical margin of this narrowly impunctate, but the punctures just beyond densely crowded to the abruptly depressed, apical rims which are densely white fasciate, the apical area narrowed medially, and largely impunctate; basal tergum quite distinctly carinate at each extreme side, punctures deep and distinct, well separated or sparse on each side; terga 4 and 5 grooved across base, the groove quite finely and densely punctate, area beyond this more sparsely punctate, especially in middle, apical margins deeply and abruptly depressed, whitish fasciate; dorsal protuberances of tergum 6 rather short, divergent, narrowly rounded apically, ventral spines narrow and elongate, acute apically, nearly parallel, lateral spines subtringular and conspicuous, surface of the tergum shining, closely and rather finely punctate in large part, a deep but rather narrow excavation near center (fig. 66); sterna 1-4 shining, coarsely, deeply and rather closely punctate, apical margins rather broadly depressed, yellowish-hyaline, quite densely white fasciate; apical margin of 4 with a narrow, deep, median emargination delimited by a pair of slender, apical spines; sternum 5 fully exposed, quite closely, deeply and rather finely punctate, apical margin of the disc rather broadly emarginate medially, the apical margin deeply depressed, yellowish-hyaline, entire medially; sterna 6 and 8 entirely retracted, 8 subtriangular apically; penis valves much shorter than gonocoxites; the latter rather strongly compressed, with rather elongate, sparse hairs toward apex.

DISTRIBUTION — Illinois to New Jersey, south to Florida; April to August.

FLOWER RECORDS — *Coreopsis, Flaveria* and *Helianthus.* Robertson (1929) records this species on *Heliopsis, Lespedeza, Lycopus, Petalostemum, Psoralea, Pycnanthemum, Silphium, Teucrium* and *Verbena.*

Coelioxys hunteri Crawford

(Figs. 64 & 65)

Coelioxys hunteri Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 151. ♀.

FEMALE—Length 13-14.5 mm.; black, tegulae brownish-testaceous, legs more or less reddened; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, slightly more distant from eyes; cheeks somewhat narrower than eyes, subcarinate posteriorly, angulate below and slightly concave just above the angle, but this closely sculptured; clypeus very slightly convex, apical margin very broadly outcurved, median area more nearly straight, margin with a very narrow fringe of pale hairs; median tooth of mandibles low but distinct; median length of labrum somewhat greater than basal width; punctures rather coarse, sparse across vertex and between ocelli, area around anterior ocellus strongly swollen and impunctate; punctures of cheeks fine and close beneath the short and thin pubescence; punctures fine and close around antennae beneath the pubescence, supraclypeal area rather closely and deeply punctate on each side of an obscure, median, impunctate line; clypeus finely and irregularly rugoso-punctate; pubescence of head and thorax short, entirely pale, copious around antennae and sides of face, the clypeus largely bare; pubescence short and rather dense on cheeks, short and sparse on pleura, but more dense just below wing bases and around tubercles, the scutello-mesothoracic suture with a very fine line of pale tomentum, and scutum anteriorly with a pair of transverse lines of tomentum which end at a rather dense spot on each side of mid-line; pubescence of propodeum rather thin and elongate, entirely whitish; transverse carina of tubercle erect and conspicuous, somewhat incurved medially, extended somewhat along anterior margin of scutum, scutellum rather broadly rounded apically, subtriangular, posterior surface quite abrupt and densely tomentose; axillae acute, projecting conspicuously from sides of scutellum (fig. 64); front coxal spines represented by low, carinate tubercles; punctures of scutellum rather coarse, well separated over median area, becoming rather close between notaulices and tegulae; scutellum more closely and deeply punctate, the punctures only slightly separated; punctures of axillae separated, but rather numerous; pleura somewhat shining, punctures quite widely separated and sparse, becoming somewhat closer just below tegulae; lateral faces of propodeum somewhat smoother but dull, minutely and obscurely punctate beneath the elongate pubescence, posterior face minutely punctate toward sides but these disappearing medially, dorsal area velvety, becoming very narrowly and obscurely substriate along upper margin; wings subhyaline basally, becoming rather strongly infuscated toward apical margin, 2nd recurrent vein reaching 2nd submarginal cell slightly nearer apex than 1st does to base, or, in some specimens, these distances subequal; basal abdominal tergum with both basal and apical, white, tomentose fasciae; punctures rather sparse in large part; terga 2 and 3 with transverse, sub-basal grooves evident toward sides, but these obliterated medially, the grooves with tomentose fasciae, punctures rather fine and close between these and the base, remainder of disc sparsely punctate medially, becoming somewhat more closely punctate at extreme sides; terga 2-4 slightly depressed apically, with dense entire, white, tomentose fasciae, 4 rather sparsely punctate medially, becoming closely punctate toward sides; tergum 5 rather dull, more finely punctate, apical margin depressed but not definitely fasciate; tergum 6 dull, very finely, striately and closely punctate, apical third triangularly pointed, surface more deeply and striately punctate in part, but becoming impunctate along rim (fig. 65); sternum 6 considerably exceeding the tergum in length, triangularly acute at tip, surface rather dull, rather deeply punctate toward base but punctures becoming obscure toward apex, with a rather conspicuous, lateral and apical fringe of elongate hairs; sterna 1-4 shining, punctures deep, distinct, quite coarse, slightly separated in large part, somewhat closer at extreme sides, apical margins slightly depressed, yellowish-hyaline, and rather thinly, white fasciate; sternum 5 narrowly rounded apically, surface somewhat shining, doubly and finely punctate, with scattered, distinct punctures on a minutely and closely punctate background, apical margin very narrowly depressed but not fasciate.

DISTRIBUTION — New Mexico and Texas to Indiana, North Carolina and Florida; April to August.

FLOWER RECORDS — *Bidens, Helenium* and *Mentha.*

It seems possible that *hunteri* is the female of *floridana* Cresson, but the relationship remains to be proven.

Coelioxys immaculata Cockerell

(Figs. 65 & 66)

Coelioxys immaculata Cockerell, 1912. Canad. Ent. 44, p. 165. ♂.

Coelioxys sculptifrons Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 153. ♀. New synonymy

FEMALE—Length 11-12 mm.; black, the tegulae yellowish-hyaline, legs largely ferruginous; eyes slightly convergent below; lateral ocelli much nearer each other than to eyes, separated from margin of vertex by only slightly more than their diameter; cheeks somewhat narrower than eyes, subcarinate posteriorly, not angulate below; clypeus slightly convex at each extreme side apically, the median area rather flat, apical margin about straight, with a few obscure crenulations, rather strongly fringed with pale, yellowish hairs; median tooth of mandible low but distinct; punctures coarse, deep and close in general, slightly separated across vertex and just below anterior ocellus, rather fine and densely crowded over remainder of face and on clypeus beneath the quite dense pubescence, cheeks rather coarsely rugoso-punctate; pubescence of head and thorax entirely pale, copious over upper part of pleura and on propodeum, otherwise rather thin and inconspicuous; transverse carina of tubercles very low and inconspicuous, largely hidden by pubescence; apical margin of scutellum slightly curved, posterior and dorsal surfaces not sharply differentiated; axillae acute, quite prominent; front coxal spines evident, but very short, triangularly carinate; punctures of scutum coarse and close in general, slightly separated in median area posteriorly, this area quite strongly elevated and the area toward the notaulices shallowly concave; scutellum coarsely rugoso-punctate; the axillae very finely rugoso-punctate; pleura very coarsely rugoso-punctate or reticulate below, becoming rather finely rugose just below wing base; lateral faces of propodeum rather smooth, minutely and obscurely punctate, posterior face somewhat more shining, punctures close but somewhat more distinct, dorsal area smooth and velvety, becoming obscurely and narrowly roughened or substriate along upper margin; wings subhyaline basally, becoming rather deeply infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; basal abdominal tergum rather closely and deeply punctate, becoming very finely so toward apical margin, this with a dense and complete, whitish, apical fascia; terga 2 and 3 with basal, uninterrupted, transverse grooves, punctures between this groove and apical margin sparse but deep and rather coarse, apical margins narrowly depressed and densely white fasciate; tergum 4 more shallowly grooved, more closely punctate basad of this groove which is obliterated medially, punctures otherwise quite sparse, apical margin depressed and fasciate; tergum 5 hardly grooved but the basal half closely punctate, apical half very sparsely punctate, apical margin fasciate; tergum 6 triangular in outline, with a distinct, median, longitudinal carina, sharply depressed on each side of this, somewhat excavated toward tip, lateral margins of this area rather deeply grooved, sides nearly straight from base to tip, without angles or invaginations, surface rather dull but smooth, closely, rather deeply and finely punctate at base, punctures becoming densely crowded toward apex (fig. 65); sternum 6 rather broad at base, abruptly narrowed at tip, this produced portion extended beyond apex of the tergum, tip subacute; sterna 1-4 somewhat shining, coarsely, deeply punctate, punctures slightly but not widely separated, apical margins narrowly yellowish-hyaline, with rather dense, whitish fasciae; sternum 5 triangular in outline, the apex rather narrowly rounded, basal punctures coarse, deep and rather close, becoming minute and crowded toward middle and inevident toward the densely tessellate apex, margin with a rather dense, fasciate fringe.

MALE—Length 9.5-11 mm.; black, tegulae yellowish-hyaline, legs more or less ferruginous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks subequal to eyes in width, subcarinate posteriorly, broadly but shallowly concave below, this area only very thinly and inconspicuously pubescent; clypeus slightly convex, apical margin about straight; median tooth of mandibles well developed; median length of labrum about equal to basal width; punctures coarse, close and deep in general, slightly separated across vertex, cheeks becoming more reticulate, and face below ocelli rugoso-punctate, coarsely so above antennae, very finely so below and on clypeus; pubescence of head and thorax entirely pale, quite copious around antennae and over lower part of face and clypeus, largely obscuring the surface, rather thin but evident on cheeks, becoming rather dense around margin of inferior concavity and below each eye; pubescence whitish and copious over thorax laterally and posteriorly, thin and inconspicuous above; transverse carina of tubercles very low, hardly evident and largely obscured by pubescence; dorsal and posterior face of scutellum not clearly differentiated, hind margin only slightly outcurved; axillae quite prominant, acute; front coxal spines long and well developed, narrowly rounded at tip, densely pubescent posteriorly and to some degree anteriorly as well; scutum closely and coarsely

punctate in large part, punctures slightly separated only in center of posterior half, densely crowded on each side of notaulices; scutellum and axillae coarsely rugoso-punctate; pleura coarsely reticulate, lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with minute, irregular, scattered punctures, dorsal area more velvety, becoming narrowly rugoso-striate along upper margin; wings faintly infuscated, 1st recurrent vein reaching 2nd submarginal cell slightly nearer base than 2nd does to apex; basal abdominal tergum closely and deeply punctate across entire disc, with an entire, quite dense, apical, tomentose fascia, lateral margins densely white pubescent; tergum 2 with a transverse groove which is subbasal laterally but becomes submedian in position medially, punctures basad of this rather deep and quite close but not crowded, punctures between the groove and apical margin on each side, very fine and densely crowded, becoming quite sparse and rather coarse in the median area, apical margin of tergum quite deeply depressed, narrowly whitish-hyaline, with a dense, entire whitish, tomentose fascia; terga 3-5 rather deeply grooved toward base on each side of median area, punctures deep, distinct, quite close at extreme sides, becoming somewhat more widely separated or sparse medially, apical margins rather deeply depressed, yellowish-hyaline, with entire, dense, whitish, tomentose fasciae; tergum 6 tomentose across base, deeply excavated in center toward apex, dorsal protuberances rather blunt, rounded apically, distinctly divergent, the ventral pair of spines rather broad and flattened, more or less rounded at tip, the median emargination somewhat rounded, surface shining, closely and deeply punctate, punctures becoming crowded between dorsal and ventral spines, lateral spines rather blunt but conspicuous (fig. 66); sterna 1-4 deeply and rather coarsely and closely punctate throughout, apical margins depressed, yellowish-hyaline, densely white fasciate; sternum 4 very shallowly emarginate medially, the depressed, hyaline margin almost entire, with a very shallow, median emargination; sternum 5 largely retracted, apical margin with a broad, rounded and conspicuous, median emargination; sterna 6 and 8 entirely retracted, submembraneous, 8 subtruncate apically; penis valves of genital armature exceeding the gonocoxites in length, the gonocoxites slightly dilated apically, with numerous, elongate hairs forming a rather definite tuft.

DISTRIBUTION — Indiana to the New England states, south to Florida, March and April in Florida; to July in the north.

FLOWER RECORDS—*Asclepias, Baptisia, Rubus* and *Tephrosia.*

Coelioxys modesta Smith

(Figs. 65 & 66)

Coelioxys modesta Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 271. ♀.

Coelioxys modesta Graenicher, 1927. Ent. News 38, pp. 233 & 274. (biology)

Coelioxys modesta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Coelioxys modesta Michener, 1947. Amer. Midland Nat. 38, p. 450.

FEMALE—Length 8-13 mm.; black, tegulae testaceous-hyaline and legs more or less reddened; eyes subparallel; lateral ocelli subequally distant from margin of vertex and each other, very slightly more distant from eyes; cheeks much narrower than eyes, carinate posteriorly, angulate below, but this area obscured with short, dense pubescence; clypeus very slightly convex, apical margin about straight, with a fringe of short but dense pubescence; middle tooth of mandible very low and inconspicuous; median length of labrum somewhat greater than basal width; punctures coarse and deep, separated to some degree on vertex and cheeks above, becoming irregular and rather sparse and obscure below, coarse and subcontiguous below ocelli, more finely rugoso-punctate on supraclypeal area and clypeus; pubescence entirely pale, very short, quite dense along sides of face and on cheeks below, forming anterior and posterior marginal fringes on pleura, scutello-mesothoracic suture with a tomentose line, and scutum with a pair of anterior transverse, tomentose lines which are widely interrupted medially, propodeum with more elongate but rather thin pubescence; transverse carina of tubercles erect and quite conspicuous, extended slightly along anterior margin of scutum; posterior margin of scutellum slightly outcurved, posterior face quite sharply distinct from dorsal face; axillae acute but quite short, extending but very slightly beyond limits of scutellum; front coxal spines reduced to low carinate tubercles; wings subhyaline basally, becoming rather deeply infuscated over apical half, recurrent veins reaching 2nd submarginal cell subequally distant and quite near, base and apex; punctures coarse, close and deep over most of scutum, scutellum and axillae, slightly separated only in scattered areas on disc of scutum; pleura shining, punctures shallow but quite coarse, well separated below, becoming rather close just below tegulae, lateral faces of propodeum smooth but dull, with barely perceptible, minute, scattered punctures, posterior face somewhat more shining,

with much closer but very fine and vague punctures, dorsal area velvety, becoming deeply, irregularly striate along upper margin; concave area of basal abdominal tergum subcarinate and with a distinct and complete white fascia, apical margin of tergum slightly depressed and with a complete white fascia, punctures rather sparse medially becoming somewhat closer at sides; transverse groove of terga 2 and 3 rather shallow, submedian in position, obliterated medially, area basad of the groove coarsely and rather sparsely punctuate near middle, becoming quite closely punctate toward sides, apical part nearly impunctate across the broad median area, but with some rather close punctures toward the sides, apical margin depressed and white fasciate; terga 4 and 5 with hardly perceptible median grooves that are entirely obliterated medially, punctures relatively close toward base, more sparse toward the apex of each plate, apical margins rather abrupt and deeply depressed and white fasciate; tergum 6 triangular in outline, the sides nearly straight, basal half somewhat shining but very closely and rather finely punctate, apical half rather abruptly depressed on each side of median line, densely tessellate, without evident punctures and with numerous erect hairs, tip acute and usually slightly upturned (fig. 65); sternum 6 nearly parallel-sided on basal portion, apex triangularly pointed, with a dense fringe of short pubescence; sterna 1-4 shining, deeply, coarsely punctate, the punctures well separated or almost sparse in center, becoming quite close toward the sides, apical margins rather broadly but shallowly depressed, these areas yellowish-hyaline and white fasciate; sternum 5 triangularly acute apically, somewhat shining, punctures not as coarse as the preceding plates, well separated medially, becoming close laterally, margins shallowly depressed but dark, with a very obscure, apical fringe of short hairs.

MALE—Length 7-12 mm.; black, tegulae testaceous-hyaline, legs more or less reddened; eyes very slightly convergent below; lateral ocelli subequally distant from eyes, margin of vertex and each other; cheeks much narrower than eyes, carinate posteriorly, with a broad, shallow, concave area beneath which it is bare, somewhat shining and obscurely reticulate; clypeus very slightly convex, apical margin about straight, with a dense fringe of short, white pubescence; middle tooth of mandibles low but distinct; median length of labrum very slightly greater than basal width; punctures coarse and deep, well separated but not sparse across vertex, somewhat closer but shallow and indefinite on cheeks, face below ocelli coarsely rugoso-punctate, becoming finely so below antennae and over clypeus; pubescence entirely pale, quite short, thin in large part, rather copious below ocelli, around antennae, on sides of face and on clypeus, very short and rather dense on cheeks above, becoming very dense along lower orbits and on hypostomal area; pleura with anterior and posterior marginal fringes of white hairs, the scutello-mesothoracic suture finely white tomentose, and scutum with a pair of anterior transverse lines of white tomentum that are widely interrupted medially; propodeum with more elongate, thin, whitish pubescence; transverse carinae of tubercles erect and rather conspicuous, extended slightly along anterior margin of scutum; hind margin of scutellum very slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae quite slender and elongate, projecting rather conspiculously from limits of scutellum, tips not reaching beyond the posterior margin medially; coxal spines reduced to carinate, triangular tubercles; wings subhyaline basally, becoming rather deeply clouded over apical half, recurrent veins reaching 2nd submarginal cell about equally distant from base and apex; punctures coarse, deep and close over entire scutum, scutellum and axillae, being slightly separated only in center of scutum; pleura shining, punctures rather well separated but irregular below, becoming quite close just below tubercles; lateral faces of propodeum quite smooth but dull, without distinct punctures, posterior face more shining, with scattered, very fine and shallow, obscure punctures, dorsal area velvety, becoming narrowly and finely substriate along upper margin; concavity of basal abdominal tergum subcarinate, with a complete but narrow, white fascia, apical margin of tergum slightly depressed, with an entire, narrow, white, apical fascia which becomes rather dense laterally, punctures well separated but not sparse over entire disc; transverse grooves obliterated medially, submedian in position on tergum 2, more basal on 3 and 4, punctures well separated and rather evenly distributed across the bases of these terga, area just beyond the transverse grooves of 2 and 3 rather broadly impunctate, but becoming quite numerous and rather fine toward the depressed apical rims, these yellowish-hyaline and white fasciate; tergum 4 with somewhat finer, evenly distributed and well separated punctures, terga 3-6 more or less densely fasciate across the bases; tergum 6 very finely and closely punctate, deeply excavated in center of upper surface, dorsal protuberances very short, divergent, broadly rounded, the ventral spines more slender and elongate, slightly divergent (fig. 66); sterna 1-4 shining between coarse, deep and rather close punctures, apical margins rather broadly depressed, yellowish-hyaline and white fasciate; sternum 4 with a shallow, median,

apical emargination; sternum 5 largely hidden, apical margin broadly and rather deeply incurved, almost emarginate; sterna 6 and 8 entirely retracted, 8 rather broadly rounded apically; penis valves about equal to gonocoxites in length, the gonocoxites quite slender, narrowly rounded at tip, bearing numerous, elongate, pale hairs.

DISTRIBUTION — Nebraska to Quebec and the New England states, south to Texas and Florida; March to August.

FLOWER RECORDS — *Aster, Ceanothus, Helianthus, Melilotus* and *Rhus.* Michener (1947) records it on *Chrysopsis,* and Robertson (1929) lists the following: *Campanula, Lepachys, Lythrum, Psoralea, Pycnanthemum* and *Verbena.*

HOSTS — *Megachile (Megachile) centuncularis* (L.) and *M. (Chelostomoides) campanulae wilmingtoni* Mitch.

Graenicher (1927) reported rearing *C. modesta* from nests of *Megachile infragilis* (*centuncularis*), but neither the host nor parasite specimens have been seen by this writer. A specimen of *modesta* reared from the nest of *M. (Chelostomoides) campanulae wilmingtoni* by K. V. Krombein has been seen, however, as well as a specimen of the host from the same nest. This seems to be a rather wide divergence of hosts for parasite species, and indicates a need for additional data.

Coelioxys moesta Cresson

(Figs. 65 & 66)

Coelioxys moesta Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 403. ♀.
Coelioxys moesta Dalla Torre, 1896. Cat. Hym. 10, p. 488.
Coelioxys banksi Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 155. ♀. New synonymy
Coelioxys banksi and *C. moesta* Medler and Koerber, 1958. Ent. Soc. Amer. Ann. 51, p. 343 (biology)
Coelioxys moesta Medler, 1959. Canad. Ent. 91, p. 114 (host)

FEMALE—Length 9.5-12 mm.; entirely black, including tegulae and legs; eyes slightly convergent below, lateral ocelli much nearer each other than to eyes, and separated from margin of vertex by little more than their own diameter; cheeks subequal to eyes in width, carinate posteriorly, angulate but not excavated below; clypeus quite flat, broadly, triangularly produced apically, apex in some specimens slightly upturned; mandibles somewhat swollen medially on outer margin, middle tooth distinct but rather small; punctures coarse, deep and distinct in general, well separated but not sparse across vertex and between ocelli, becoming close and coarse on cheeks above, fine, shallow and obscure below; face below ocelli more finely rugoso-punctate, becoming very finely rugose on supraclypeal area, on sides of face and over clypeus, a short, median, longitudinal ridge between antennae; pubescence of head and thorax entirely pale, rather copious and elongate around antennae and ocelli and on cheeks below, short and rather thin on cheeks above, very short and subappressed on supraclypeal area and clypeus, becoming strongly yellowish on clypeus apically, yellowish on mandibles with numerous, elongate, erect hairs; pleura with rather elongate but thin, white and rather copious pubescence, posterior face of propodeum quite copiously long pubescent; transverse carina of tubercle very low and inconspicuous, largely obscured by erect pubescence; apical margin of scutellum somewhat outcurved, rounded, without a distinct, posterior and dorsal face; axillae very short and rather blunt, projecting but very slightly from margin of scutellum; coxal spines reduced to broadly carinate, triangular tubercles; wings subhyaline basally, lightly infuscated apically and along margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures coarse, close and deep, rather uniformly distributed over most of scutum, scutellum, axillae and pleura, but somewhat finer on axillae and on scutellum laterally, slightly separated in center of scutum posteriorly; lateral faces of propodeum smooth but dull, posterior face dull and tessellate, with rather close but fine and obscure, vague punctures, dorsal area more velvety, becoming very faintly reticulate along dorsal margin; basal abdominal tergum shining, punctures deep and distinct but rather sparse medially, becoming somewhat finer and closer laterally, apical margin slightly depressed and densely white fasciate; terga 2 and 3 with shallow, transverse grooves which are narrowly obliterated medially, sub-basal at extreme sides but becoming median toward the center, portion of each with deep, distinct, rather fine, well separated punctures, these becoming quite close at extreme sides, the apical half somewhat more coarsely and sparsely punctate in center, becoming close laterally, and fine and close toward the depressed, apical rims which are densely white fasciate; tergum 4 somewhat depressed toward base at sides, but not definitely grooved, punctures about as those on 3, apical margin definitely white fasciate; tergum 5 rather finely and closely punctate across base, punctures becoming somewhat more widely separated toward apical margin, this

with a very thin, apical fringe of whitish hairs; tergum 6 elongate-triangular, sides straight, with a median, longitudinal, faint line toward base, which continues as a quite distinct, median ridge toward apex, rather deeply depressed on each side of this, apex narrowly rounded (fig. 65); sternum 6 narrow and elongate, strongly downcurved and protruding much beyond apex of tergum, conspicuously notched on each side toward tip, this part somewhat longer than the width at the notches; sterna 1-4 shining, deeply and rather coarsely and closely punctate, punctures somewhat more widely separated medially, apical margins narrowly depressed, subhyaline, with narrow fringes of white pubescence; sternum 5 produced apically, subtriangular, with rather numerous but well separated, coarser punctures toward base, these becoming very fine, indefinite and close toward apical margin, with a thin, whitish, apical fringe on each side of tip.

MALE—Length 7-11 mm.; entirely black, including tegulae and legs; eyes somewhat convergent below; lateral ocelli subequally distant from each other and margin of vertex, considerably more distant from eyes; cheeks subequal to eyes in width, subcarinate posteriorly, with a very broad and shallow, flattened area below which is not distinctly concave, but is margined with rather dense pubescence anteriorly and a fringe of long hairs posteriorly, ending at the quite distinct hypostomal carinae; clypeus very slightly convex, apical margin slightly produced, nearly straight, surface entirely covered with dense, pale pubescence; median length of labrum very slightly greater than basal width; median tooth of mandible well developed; punctures quite coarse, deep and distinct, slightly separated across vertex, upper cheeks becoming coarsely rugoso-punctate, face below ocelli densely and rather coarsely rugose, becoming very finely but densely rugose below antennae and over clypeus; pubescence entirely pale, quite copious and dense over most of face below ocelli, short and rather dense on cheeks below, thinner above; pubescence quite copious but rather short on pleura and posterior face of propodeum, without distinct, marginal fringes on the pleura; transverse carina of tubercles very low but evident; posterior margin of scutellum slightly outcurved, the posterior and dorsal faces not distinctly separated; axillae very short, protruding very slightly beyond limits of scutellum; coxal spines well developed but rather short, round at apex, densely pubescent posteriorly and laterally; wings subhyaline at base, becoming faintly clouded apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of pleura and dorsum of thorax quite uniformly coarse, close and deep; being contiguous in large part; lateral faces of propodeum rather smooth but dull, posterior face somewhat more shining, with close but very minute and obscure punctures, dorsal area more velvety, becoming rather broadly but very finely and obscurely rugose along upper margin; basal abdominal tergum shining, rather closely and deeply punctate, punctures slightly separated in median area, apical margin rather abruptly depressed, obscurely fasciate, with a dense, tomentose patch at each extreme side; terga 2 and 3 with transverse, uninterrupted, sub-basal grooves, basal area behind grooves rather evenly, finely and regularly punctate, punctures well separated; disc beyond the grooves more closely and coarsely punctate, but rather sparsely so in center, 2 with a quite deep and distinct but rather short fovea on each side, the margins of this narrowly impunctate, apical margins narrowly depressed, densely white fasciate toward sides but these rather widely interrupted or very narrow medially; terga 4 and 5 shining, closely and quite deeply punctate toward sides, the punctures more widely separated medially, with a basal, tomentose band and the depressed, apical rim white fasciate; tergum 6 white tomentose at base, very closely and finely punctate, rather deeply excavated in center, dorsal protuberances narrow and spine-like, elongate and strongly divergent, ventral spines less strongly divergent but equally long and slender, lateral spines much elongated and acute (fig. 66); sterna 1-4 shining, deeply and coarsely punctate, punctures rather well separated medially, becoming quite close laterally, apical margins rather broadly depressed and yellowish-hyaline, densely white fasciate; disc of sternum 4 not emarginate medially, but depressed rim with a very slight, median, triangular emargination; sternum 5 largely retracted, apical margin rather broadly incurved; sterna 6 and 8 entirely retracted, 8 rather narrowly subtruncate apically; gonocoxites of genital armature only slightly exceeding penis valves, somewhat compressed, with numerous, fine, erect, rather elongate hairs.

DISTRIBUTION — Alaska and British Columbia to Nova Scotia, south to Colorado, Indiana and Virginia; May to September.

FLOWER RECORD—*Solidago*.

HOSTS—*Megachile centuncularis* (L.) and *M. relativa* Cress.

Coelioxys obtusiventris Crawford

Coelioxys obtusiventris Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 150. ♀.

FEMALE—Length 12 mm.; black, mandi-

bles, labrum, tegulae and legs ferruginous, abdominal sterna dark red; eyes slightly convergent below, lateral ocelli slightly nearer margin of vertex than to eyes; cheeks much narrower than eyes, margin sharply carinate below; clypeus nearly flat, margin nearly straight, not produced; mandibles 3-dentate; punctures of head and thorax deep and distinct, coarse and quite close on vertex and cheeks, crowded below ocelli, and over clypeus and supraclypeal area, slightly separated on scutum medially and on scutellum, close on pleura above, more coarse and more widely separated below; tubercles sharply carinate; coxal spines reduced to dentiform tubercles; scutellum with a slight median angle; axillae slender, conspicuous, produced much beyond margin of scutellum; pubescence whitish, very short and thin, rather dense on cheek, face and clypeus, the latter with numerous erect, yellowish hairs, pleura with narrow lines of pubescence anteriorly and posteriorly, propodeum with more copious, but short, white pubescence; wings lightly infuscated, more deeply so apically, veins brownish, margin of basal concavity of tergum 1 obscurely carinate, thinly white fasciate, terga 2 and 3 with rather shallow, transverse grooves which are widely interrupted medially; punctures of abdominal terga deep and distinct, but fine, well separated on 1 and across base of 2-4, very sparse on median area of each disc, becoming rather close along apical margin, very fine and sparse on 5 and 6; tip of tergum 6 very slightly upturned; 1-5 with narrow but entire white apical fasciae, apex of 6 densely brownish tomentose, impressed on each side; sterna 1-5 closely and deeply punctate, quite coarse at base, becoming fine on sternum 5; sternum 6 slightly flared apically, with a long apical spine, apical margin with a prominent fringe of long brownish hairs, nearly equalling the spine in length.

DISTRIBUTION—Florida.

This species is known only from the holotype specimen in the U. S. National Museum. It is evidently related to *C. modesta*, but is easily separated by the 6th sternum. This is triangularly pointed in *modesta*, without a distinct apical spine, and the fringe is very short.

Coelioxys 8-dentata Say

(Figs. 64 & 65)

Coelioxys 8-dentata Say, 1824. In Keating, Narr. Long's 2nd Exped. 2, p. 353. ♂.

Coelioxys brevis Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 402. ♀ ♂. (preocc.)

Coelioxys altilis Cresson, 1879. Amer. Ent. Soc. Trans. 7, p. 219. (new name)

Coelioxys cressoni Dalla Torre, 1896. Cat. Hym. 10. p. 485. (new name)

Coelioxys 8-dentata Fox, 1900. Ent. News 11, p. 553. (host)

Coelioxys octodentata Hicks, 1926. Colo. Univ. Studies 15, p. 227. (biology)

Coelioxys octodentata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Coelioxys 8-dentata Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1060. (larva)

Coelioxys 8-dentata Michener, 1953. Kans. Univ. Sci. Bul. 35, pp. 1737-1742. (biology)

FEMALE—Length 8-12 mm.; black, tegulae yellowish-hyaline, legs beyond the trochanters reddish-testaceous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; cheeks considerably narrower than eyes, subcarinate posteriorly, strongly narrowed below, angulate below, but this area obscured by short dense pubescence; clypeus nearly flat, apical margin straight, densely fringed with rather short, pale pubescence; median length of labrum about equal to basal width; median tooth of mandible well developed, somewhat nearer apical tooth than inner angle; punctures deep and distinct, distinctly but not widely separated across vertex, close, coarse and irregular on cheeks above, becoming finer and more obscure below; some irregular smooth spaces surrounding anterior ocellus, but this area otherwise rather coarsely, irregularly punctate, a narrow, smooth, impunctate area near top of eye on inner margin; face below antennae irregularly rugose, the clypeus quite finely so; pubescence entirely pale, short, rather dense around antennae and on cheeks below, pleura with rather distinct, anterior and posterior fringes of white hair, scutello-mesothoracic suture with a tomentose line, and scutum anteriorly with a pair of transverse, tomentose bands that are widely interrupted medially; propodeum largely covered with elongate, whitish hairs; transverse carina of tubercles erect and conspicuous, extending but very slightly along anterior margin of scutum; posterior margin of scutellum nearly straight, posterior face quite distinct, densely white tomentose; axillae quite robust, acute apically, projecting quite conspicuously from margin of scutellum (fig. 64); front coxal spines short but quite distinct, broadly triangular, with narrowly acute apex; wings lightly infuscated, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum close, coarse, deep and distinct, being slightly separated only in center of disc, becoming somewhat finer and densely crowded between notaulices and tegulae, scutellum and axillae somewhat more finely rugoso-punctate;

pleura with coarse, confluent punctures, being almost reticulate; lateral faces of propodeum smooth but dull, posterior face somewhat more shining, with very minute and close, obscure punctures, dorsal area more velvety, becoming more finely substriate along upper margin; basal abdominal tergum shining, deeply punctate, the punctures somewhat sparse in center, very close at extreme sides, apical margins slightly depressed, with a complete, white, apical fascia; terga 2 and 3 with complete, rather deep, transverse grooves, punctures basad of these quite evenly distributed, deep, distinct and quite close, the apical portion of disc very sparsely punctate medially, becoming rather closely punctate at extreme sides, the grooves medially somewhat nearer the apical margin; margins of discs narrowly depressed, with entire, whitish, apical fasciae, these becoming very broad and dense laterally; tergum 4 with a shallow, transverse groove and 5 slightly impressed in the same relative position, punctures basal to this quite uniformly close, deep and distinct, the more apical areas almost impunctate medially, but becoming rather closely punctate at each side, apical margins narrowly depressed, with entire, white fasciae; tergum 6 subtriangular in outline, sides very slightly incurved at about mid point in length, but not at all angulate, with an obscure, median line which continues toward apex as a somewhat elevated ridge, rather deeply excavated on each side of this, the tip narrowly rounded, sides slightly grooved, punctures of basal part deep, distinct and moderately coarse, becoming fine and densely crowded toward apex (fig. 65); sternum 6 rather narrow, quite deeply notched on each side toward apex, this part somewhat longer than width at the notches; abdominal sterna 1-4 somewhat shining, very closely, deeply and quite coarsely punctate, apical margins slightly depressed, rather broadly yellowish-hyaline, densely white tomentose, forming complete but rather loose fasciae; sternum 5 subtriangular in outline, basal portion deeply and closely punctate, but punctures becoming fine and dense toward the impunctate and finely roughened, subacute apex, sides fringed with dense, white tomentum.

MALE—Length 8-10 mm.; black, tegulae yellowish-hyaline, legs largely brownish-ferruginous; eyes rather strongly convergent below; lateral ocelli slightly nearer margin of vertex than to eyes, and slightly nearer each other than to margin of vertex; cheeks very slightly narrower than eyes, subcarinate posteriorly, with a bare, deeply concave and elongate area below which has a marginal fringe of dense, whitish pubescence; clypeus nearly flat, apical margin nearly straight, entire surface densely covered with yellowish pubescence which obscures the surface; median length of labrum about equal to basal width; middle tooth of mandible well developed; punctures quite coarse, deep and distinct, well separated across vertex, becoming sparse just back of lateral ocelli and toward upper margin of eye, cheeks becoming somewhat more finely and closely punctate below, anterior ocellus surrounded in part by a somewhat elevated impunctate area, and narrow margin at upper end of eye impunctate, face otherwise finely and densely rugose beneath the dense pubescence; pubescence of face yellowish-white, subappressed in part, that on cheeks more whitish, short and thin; pleura with marginal fringes of whitish hairs, the scutello-mesothoracic suture with a line of fine tomentum, and scutum anteriorly with a pair of transverse, somewhat curved tomentose lines which are widely separated medially; propodeum largely covered with more erect and fine, pale pubescence; transverse carinae of tubercles erect but largely obscured by a fringe of yellowish hairs; posterior margin of scutellum nearly straight, posterior face rather sharply delimited from dorsal face, rather densely pubescent; axillae quite robust, acute apically, projecting quite conspicuously from sides of scutellum; coxal spines well developed, somewhat flattened, narrowly rounded apically, densely pubescent posteriorly and laterally; wings subhyaline basally, becoming faintly infuscated apically, 1st recurrent vein reaching 2nd submarginal cell much nearer base than 2nd does to apex; scutum very coarsely, closely and deeply punctate, punctures nearly contiguous throughout, becoming somewhat more dense laterally; scutellum and axillae rather coarsely rugoso-punctate; pleura with rather shallow but coarse, subcontinuous punctures; lateral faces of propodeum smooth but dull, posterior face somewhat more shining, with rather close, minute, obscure punctures, dorsal area rather broadly velvety, becoming obscurely rugoso-striate along upper margin; basal abdominal tergum shining but closely and deeply punctate, apical margin somewhat depressed, with an entire whitish fascia; terga 2 and 3 with entire, transverse grooves which are clearly evident at mid point of disc, punctures basad of the grooves deep, distinct, quite coarse but close and regular, the punctures beyond the grooves more irregular, very sparse and coarse medially, where the surface is shining, becoming finely and densely rugose just behind the rather distinct foveae, these somewhat elongated, margined with a shining impunctate ridge, apical margins of these terga densely white fasciate; terga 4-6 more or less densely fasciate at base, 4 and 5 with an apical, dense, whitish fascia which is somewhat narrowed medially, punc-

tures quite coarse, deep and distinct, slightly but not widely separated medially; surface of tergum 6 very closely, deeply and rather finely punctate, a deep, median excavation just before tip, dorsal protuberances divergent, rather narrowly rounded ventral spines more nearly parallel-sided, rather short and blunt, lateral spines well developed, subacute (similar to *sayi*, fig. 66); sterna 1-4 shining, with coarse, deep and quite uniformly close punctures, apical margins rather broadly depressed, yellowish-hyaline, densely white tomentose, forming conspicuous fasciae; disc of sternum 4 not emarginate medially, depressed rim without a conspicuous, median emargination; sternum 5 largely retracted, apical margin nearly straight; sterna 6 and 8 entirely retracted; gonocoxites only slightly exceeding penis valves, rather broadly compressed, with scattered and rather conspicuous, elongate hairs.

DISTRIBUTION—British Columbia and California, east to Quebec, the New England states, and Florida; May to October.

FLOWER RECORDS — *Asclepias Baptisia, Cuscuta, Eriogonum, Fragaria, Geranium, Helenium, Hieraceum, Melilotus, Oenothera, Phaseolus, Rhus, Rubus,* and *Rudbeckia.* Robertson (1929) lists the following additional host genera: *Amorpha, Apocynum, Aster, Bidens, Blephilia, Boltonia, Brauneria, Coreopsis, Crotalaria, Desmodium, Dianthera, Eryngium, Eupatorium, Helianthus, Heliopsis, Krigia, Lepachys, Lippia, Lobelia, Lythrum, Nepeta, Petalostemum, Polytaenia, Psoralea, Pycnanthemum, Solidago, Symphoricarpus, Trifolium, Verbena, Verbesina* and *Veronica.*

HOST—J. T. Medler has reared *8-dentata* from nests of *Megachile centuncularis* and *M. mendica.* It is also recorded from nests of *M. brevis* by Hicks (1926) and Michener (1953).

Coelioxys piercei Crawford

(Figs. 65 & 66)

Coelioxys piercei Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 152. ♀.

FEMALE—Length 10 mm.; black, tegulae brownish-testaceous, legs somewhat reddened apically; eyes slightly convergent below; lateral ocelli nearer each other than to eyes, and nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, subcarinate posteriorly, strongly narrowed below, obscurely angulate, slightly concave, due largely to the erect, posterior carina; clypeus nearly flat, margin about straight, with a dense fringe of elongate pale yellowish hairs; middle tooth of mandible well developed; median length of labrum somewhat greater than basal width; punctures coarse and deep, quite close over most of vertex and between ocelli, cheeks coarsely rugoso-punctate, face below ocelli somewhat more finely so, becoming very finely rugose below antennae and over clypeus; pubescence entirely pale, very short and decumbant over most of face, clypeus largely bare except for the apical fringe, pubescence rather short but quite dense on cheeks below; pubescence quite copious over pleura, without definite, marginal fringes, somewhat more elongate but still thin on propodeum, becoming somewhat more dense on each side of posterior face; transverse carina of tubercles low but distinct, largely obscured by the erect pubescence; posterior margin of scutellum somewhat outcurved, posterior and dorsal faces not sharply differentiated; axillae acute, quite robust, projecting quite conspicuously from sides of scutellum; coxal spines reduced to broadly carinate and sharply acute tubercles; wings subhyaline basally, becoming lightly infuscated over median and apical areas, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse, deep and distinct, close in large part, becoming very slightly separated toward posterior margin medially, somewhat more dense and fine around notaulices; scutellum coarsely rugoso-punctate, the axillae somewhat more finely so; punctures of pleura shallow but coarse and close, becoming rugose just below tegulae; lateral faces of propodeum smooth but dull, posterior face densely tessellate, with fine, close but obscure and vague punctures, dorsal area velvety, becoming finely reticulate along upper margin; basal abdominal tergum shining, rather closely and deeply punctate, apical margins slightly depressed, with a complete, white fascia which forms dense white patches at extreme sides, but is rather narrow medially; terga 2 and 3 with deep, distinct and complete transverse grooves, these submedian at center, becoming basal toward the sides, punctures on basal side of these grooves rather close, coarse and distinct, but quite uniform, those toward the apex quite similar but more irregular and widely separated, apical margins rather deeply and narrowly depressed, densely white fasciate; terga 4 and 5 shallowly grooved across median portion of disc, surface somewhat more dull than the basal terga, more finely and closely punctate especially on 5, apical margins depressed and fasciate; tergum 6 triangular in outline, basal half or more very densely and finely, uniformly punctate, with a slight median ridge toward the tip, rather deeply excavated

on each side, the sides slightly angulate at this point, narrowly rounded at tip, quite deeply grooved on each side (fig. 65); sternum 6 more narrowly triangular, protruding considerably beyond tip of the tergum, sides quite straight; sterna 1-4 somewhat shining, coarsely, deeply and quite closely punctate throughout, apical margins depressed, yellowish-hyaline, rather narrowly but distinctly white fasciate; sternum 5 subtriangular in form, apex narrowly truncate, surface dull, with fine, densely crowded punctures, becoming somewhat coarser toward sides basally, apical margin narrowly white fasciate.

MALE—Length 9-11 mm.; black, including tegulae and legs; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks subequal to eyes in width, subcarinate posteriorly, broadly but shallowly concave below, this area only very thinly and inconspicuously pubescent; clypeus slightly convex, apical margin about straight, with a pair of small denticles on each side of center; median tooth of mandibles well developed; median length of labrum about equal to basal width; punctures coarse, close and deep in general, slightly separated across vertex, cheeks becoming more reticulate, and face below ocelli rugoso-punctate, coarsely so above antennae, finely so below and on clypeus; pubescence of head and thorax entirely pale, yellowish and quite copious around antennae and over lower part of face and clypeus, largely obscuring the surface, whitish and rather thin but evident on cheeks, becoming rather dense around margin of inferior concavity and below each eye; pubescence whitish and rather copious over thorax laterally and posteriorly, thin and inconspicuous above; transverse carina of tubercles very low, hardly evident, largely obscured by pubescence; dorsal and posterior face of scutellum quite distinct, hind margin slightly outcurved; axillae quite prominant, acute; front coxal spines long and well developed, narrowly rounded at tip, with an apical tuft of hairs on outer side; scutum closely and rather coarsely punctate in large part, punctures slightly separated only in center of posterior half, crowded around notaulices; scutellum and axillae coarsely rugoso-punctate; pleura with coarse, shallow, subcontiguous punctures; propodeum rather smooth but dull, posterior face with minute, rather close punctures, dorsal area more velvety, becoming narrowly rugoso-striate along upper margin; wings faintly infuscated, 1st recurrent vein reaching 2nd submarginal cell slightly nearer base than 2nd does to apex; basal abdominal tergum closely and deeply punctate across entire disc, with an entire, quite dense, apical, tomentose fascia, lateral margins densely white pubescent; tergum 2 with a transverse groove which is sub-basal laterally but becomes more apical in position medially, punctures basad of this deep and quite close but not crowded, punctures between the groove and apical margin on each side, very fine and densely crowded, becoming slightly coarser in the median area, apical margin of tergum quite deeply depressed, densely white fasciate; tergum 3 much like 2, but punctures on each side not so densely crowded; terga 4 and 5 rather deeply depressed toward base, this basal area densely white tomentose, punctures of disc deep, distinct, quite close and evenly distributed, apical margins rather deeply depressed, narrowly white fasciate; tergum 6 tomentose across base, deeply excavated in center toward apex, dorsal protuberances broadly rounded apically, distinctly divergent, the ventral pair of spines rather broad and flattened, more or less rounded at tip, the median emargination somewhat rounded; surface of tergum 6 shining, closely and deeply punctate, punctures becoming crowded between dorsal and ventral spines, lateral spines distinct, acute (fig. 66); sterna 1-4 deeply and rather coarsely and closely punctate throughout, apical margins depressed, densely white fasciate; disc of sternum 4 not emarginate medially, but the depressed margin with a narrow but distinct median emargination; sternum 5 largely retracted, apical margin with a broad, shallow, median emargination; sterna 6 and 8 entirely retracted, submembraneous, 8 subtruncate apically; penis valves of genital armature exceeding the gonocoxites in length, the gonocoxites slightly dilated apically, with numerous, elongate hairs forming a rather definite tuft.

DISTRIBUTION—Texas to Florida and North Carolina; April and May.

FLOWER RECORD—*Oenothera.*

HOST—It seems probable that this species is parasitic upon *Megachile oenotherae.*

This is the first recognition of the male of *piercei.*

Coelioxys porterae Cockerell

(Figs. 64-66)

Coelioxys (*lucrosa* var. ?) *porterae* Cockerell, 1900. Canad. Ent. 32, p. 298. ♀.

FEMALE—Length 9-11 mm.; largely black, including the legs, but tegulae more brownish to piceous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, much more distant

from eyes; cheeks subequal to eyes in width, carinate posteriorly, the marginal carina becoming very high toward the inferior angle; clypeus nearly flat, apical margin about straight, finely crenulate, without a distinct, apical fringe; median length of labrum about equal to basal width; upper surface of mandibles swollen medially, resulting in an obscure, submedian angle, middle tooth rather low but distinct; punctures coarse, deep and distinct, only slightly separated across vertex, cheeks becoming coarsely rugoso-punctate, more finely so below, face just below anterior ocellus rather coarsely rugose, becoming finely so below antennae and on clypeus, a short, longitudinal, raised line between the antennae; pubescence entirely pale, quite short on head, somewhat more elongate around antennae and on cheeks below, somewhat yellowish, subappressed but rather thin over clypeus, rather copious along margins of pleura but not forming definite fasciae, rather copious around wing bases and on posterior face of propodeum; transverse carina of tubercle very low and inconspicuous, barely evident beneath pubescence; posterior margin of scutellum slightly curved, posterior face not sharply differentiated from the dorsal face; axillae acute, projecting from lateral margins of scutellum, but not exceeding its median length (fig. 64); front coxal spines very short but distinct, bearing a tuft of elongate, pale hairs posteriorly; wings hyaline at base, becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse and deep, slightly separated across median portion of disc between notaulices, but elsewhere very close; scutellum rather coarsely rugoso-punctate, axillae somewhat more finely so; pleura closely and coarsely but rather shallowly punctate, with only very narrow, intervening spaces evident, becoming coarsely and densely rugose below tegulae; lateral faces of propodeum dull and densely tessellate but rather smooth, posterior face dull but with more evident but extremely minute punctures, dorsal area narrowly smooth and velvety, but becoming finely rugose along upper margin; basal abdominal tergum somewhat shining medially, punctures deep and distinct but rather fine and close, apical margin narrowly depressed, white fasciate toward sides; transverse grooves of terga 2 and 3 complete, distinct but rather shallow, submedian in position but becoming more nearly basal at sides, punctures on the basal side deep and distinct, but rather fine, regularly close but not crowded, surface toward the apical margin much more sparsely punctate and shining, margins deeply depressed and white fasciate, fascia thin but evident medially; terga 4 and 5 with fine and rather close punctures toward base, becoming sparse toward apical margin, this abruptly and narrowly depressed, more or less whitish fasciate; apical part of tergum 6 rather abruptly narrowed, the sides incurved but not angulate, a narrow, median, impunctate line from base toward the apex, which is continuous with a median raised ridge apically, rather deeply depressed on each side of this, the tip narrowly rounded, surface toward the base shining, finely, closely and distinctly punctate, punctures becoming densely crowded toward tip (fig. 65); sternum 6 narrow and elongate reaching much beyond the tergum, sides distinctly but rather finely notched toward apex, this part somewhat longer than width at the notches, very narrowly rounded apically; sterna 1-4 shining, rather coarsely and quite deeply punctate, punctures somewhat separated medially, becoming close laterally, apical margins very narrowly depressed, thinly white fasciate; sternum 5 broadly triangular, with a more or less pointed apex, narrowly fasciate along margin, closely but distinctly punctate at base, the punctures becoming minute and crowded apically, the more apical part of the disc densely tessellate, without evident punctures.

MALE—Length 9-12 mm.; largely black, including legs, tegulae more brownish to piceous; eyes slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks slightly broader than eyes, carinate posteriorly, with a very broad, shallowly concave area below, posterior margin of this produced to form a rounded, carinate tubercle, surface of the concavity shining, impunctate and bare; clypeus nearly flat, apical margin nearly straight, with 4 or 5 low tubercles; median length of labrum about equal to basal width; median tooth of mandible distinct; punctures coarse and deep, distinctly but not widely separated across vertex, cheeks more coarsely rugoso-punctate above, becoming more finely and irregularly so below, face between antennae and ocelli coarsely rugoso-punctate, becoming finely so below antennae and on clypeus; pubescence entirely pale on head and thorax, rather copious over front of face and on clypeus, on cheeks below, over most of pleura and propodeum, very thin but erect and rather elongate on dorsum of thorax; transverse carina on tubercles very low and inconspicuous, largely obscured by pubescence; posterior margin of scutellum slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae acute, projecting distinctly from sides of scutellum, but not exceeding median length of scutellum; front coxal spines quite long and erect, subcarinate, the tips broadly rounded, long white pubescent posteriorly; wings subhyaline basal-

ly, becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum coarsely, closely and deeply punctate throughout, being somewhat more coarse and distinct in center posteriorly, becoming very fine and densely crowded between notaulices and tegulae; scutellum coarsely rugoso-punctate, the axillae somewhat more finely so; pleura rather coarsely but shallowly rugoso-punctate or reticulate; lateral faces of propodeum smooth but dull, posterior face dull but with rather close, minute and obscure punctures evident, dorsal area velvety, becoming very finely striate along upper margin; basal abdominal tergum shining, punctures deep and distinct, slightly separated in center, becoming very close toward sides, apical margin slightly depressed toward sides where they are white fasciate; transverse grooves of terga 2 and 3 complete, submedian along center but becoming somewhat more basal laterally, basal area deeply, distinctly and rather coarsely and regularly punctate, while the apical area is more shining and sparsely punctate medially, punctures becoming very close and rather fine at extreme sides, apical margins rather abruptly and deeply depressed, densely white fasciate laterally, becoming very thin medially; tergum 2 with a pair of broad, shallow foveae, adjacent punctures minute and densely crowded; tergum 4 with a more basal and shallow, transverse groove, punctures somewhat similar to 2 and 3, apical margin quite deeply depressed, subhyaline, fasciate as the others; tergum 5 thinly fasciate across the base as well as across the depressed apex, punctures rather close toward base, becoming more sparse toward the depressed margin; tergum 6 fasciate along the base, surface very closely and finely punctate, with a deep, median, subapical concavity, the dorsal projections very short, subtriangular, with rounded apex, strongly divergent, ventral spines more elongate, narrow and acute, intervening emargination broadly rounded, lateral spines distinct and acute (fig. 66); sterna 1-4 shining closely, deeply, regularly and rather coarsely punctate, apical margins rather deeply depressed, subhyaline, densely white fasciate; disc of sternum 4 not appreciably emarginate apically, but depressed margin with a very small, inconspicuous, median emargination; sternum 5 submembraneous, largely hidden, apical margin broadly and shallowly incurved medially; sterna 6 and 8 entirely retracted, 8 somewhat narrowed apically, the apex narrowly rounded; gonocoxites of genital armature much exceeding penis valves in length, somewhat compressed, bearing numerous elongate setae along outer surface to the tip.

DISTRIBUTION—Alberta to Nova Scotia, in Canada, Wisconsin to Maine, south to North Carolina; April to August.

FLOWER RECORDS — *Baptisia, Coreopsis, Galax, Geranium, Houstonia, Hydrangea, Polygala, Pycnanthemum, Rubus,* and *Vaccinium.*

HOST—*Megachile relativa.*

Coelioxys rufitarsis rufitarsis Smith

(Figs. 65 & 66)

Coelioxys rufitarsis Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 271. ♂.
Coelioxys dubitata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 272. ♀. New synonymy
Coelioxys rufitarsis Cockerell, 1900. Canad. Ent. 32, p. 298.
Coelioxys rufitarsis Graenicher, 1906. Wis. Nat. Hist. Soc. Bul. 4, p. 138. (biology)
Coelioxys dubitata var. *melanopoda* Viereck, 1917 (1916). Conn. State Geol. and Nat. Hist. Survey Bul. 22, p. 747. ♂.
Coelioxys rufitarsis Hicks, 1926. Colo. Univ. Studies 15, p. 230. (biology)
Coelioxys rufitarsis Graenicher, 1927. Ent. News 38, p. 233. (biology)
Coelioxys rufitarsis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12-13 mm.; black, tegulae more brownish-piceous, tarsal segments bright ferruginous, the tibiae and femora sometimes more or less ferruginous; eyes slightly convergent below; lateral ocelli slightly nearer margin of vertex than to each other, considerably more distant from eyes; cheeks considerably narrower than eyes, carinate posteriorly, angulate below, but this area covered with dense pubescence; clypeus nearly flat, apical margin about straight, with a fringe of rather short but dense pubescence; median length and basal width of labrum about equal; median tooth of mandible low but distinct; punctures deep and quite coarse, close but distinct across vertex, cheeks and face below ocelli coarsely rugose, becoming finely rugose below antennae and on clypeus; pubescence entirely pale on head and thorax, somewhat yellowish on face, copious around antennae and behind anterior ocellus, very short, dense and subappressed at sides of face, laterad of clypeus, thin and very short and obscure over most of clypeus, dense and white on cheeks below, becoming thin above; pubescence rather short but quite copious over pleura, more elongate and whitish on propodeum, very thin and inconspicuous on dorsum of thorax; transverse carina of tubercles rather low but distinct, more or less obscured by pubescence;

posterior margin of scutellum slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae acute, projecting conspicuously from sides of scutellum, but length not exceeding median length of scutellum; coxal spines reduced to short but acute tubercles which are densely pubescent posteriorly; wings hyaline basally, becoming very faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum coarsely, closely and deeply impunctate, punctures slightly separated only in center posteriorly, densely crowded and somewhat finer laterally, but distinctly separated to anterior margin; scutellum coarsely rugoso-punctate or reticulate, the axillae somewhat more finely so; pleura more reticulate than punctate, punctures coarse and closely crowded; lateral faces of propodeum somewhat smoother but very dull, posterior face dull, with closely crowded, minute punctures, dorsal area smooth but velvety, becoming narrowly substriate along upper margin; basal abdominal tergum shining, punctures deep and distinct, well separated medially, becoming close laterally, and very close and fine toward the depressed apical margin, this narrowly white fasciate, but becoming rather broadly so at extreme sides; transverse grooves of terga 2 and 3 submedian at center, becoming somewhat more basal at extreme sides, punctures quite regular, coarse and close on basal side of groove, the apical side being largely impunctate, but with scattered punctures toward the apical margin, this depressed and densely white fasciate; terga 4 and 5 rather closely punctate toward base, sparsely so toward apical margin, the margins depressed and white fasciate; tergum 6 abruptly narrowed just beyond mid point, resulting in a pair of distinct lateral angles, a median, slightly raised, impunctate line at base, continuous with an elevated ridge toward the tip, surface deeply excavated on each side of this, the tip narrowly rounded, punctures toward the base deep, distinct, rather coarse and close, becoming densely crowded at the lateral angles, the apical part finely rugose (fig. 65); sternum 6 elongate, extending much beyond tip of tergum, narrowed apically, with a pair of distinct, lateral notches, this area much longer than width at the notches, rather narrowly rounded at apex; sterna 1-4 shining, closely, coarsely, deeply and quite regularly punctate, apical margins depressed, yellowish-hyaline, densely white fasciate; sternum 5 triangular in outline, basal portion deeply and quite closely punctate, but the punctures becoming rather abruptly fine and densely crowded just beyond base, apical half dull and densely roughened, the oblique, lateral margins densely, white fasciate.

MALE—Length 11-12 mm.; black, tegulae more brownish-testaceous, tarsi ferruginous, and tibiae usually ferruginous basally and apically; eyes rather strongly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks slightly narrower than eyes, carinate posteriorly, quite deeply excavated below, this area shining and bare, relatively smooth, margined both anteriorly and posteriorly by dense pubescence; clypeus nearly flat, apical margin straight, with a pair of small, median tubercles; median length of labrum slightly greater than basal width; median tooth of mandible well developed; punctures coarse and deep, well separated across vertex, becoming closely crowded on cheeks, face below ocelli rather finely rugose, surface below antennae and on clypeus obscured by dense pubescence, very finely rugose beneath; pubescence entirely pale, rather creamy on face, somewhat more elongate and erect around bases of antennae, subappressed and directed upward on supraclypeal area, directed downward on clypeus, cheeks below with dense, white pubescence; pleura rather copiously covered with white pubescence, not forming definite marginal fringes, the pubescence becoming somewhat more yellowish but very thin above, elongate and copious over most of propodeum; transverse carina of tubercles erect and well developed on outer side, not extended along margin of scutum, largely obscured by pubescence; posterior margin of scutellum very slightly outcurved, posterior face not sharply differentiated from dorsal face; axillae rather elongate and acute, conspicuously diverging from sides of scutellum, and slightly exceeding median length of scutellum; coxal spines well developed, somewhat spatulate and elongate, rounded apically, densely covered with white pubescence; wings hyaline basally, becoming slightly infuscated along apical margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum coarsely, deeply and closely punctate, punctures slightly separated only in center of disc, becoming somewhat finer and more densely crowded laterally; scutellum rather coarsely rugoso-punctate or reticulate, the axillae only slightly more finely so; pleura dull, rather finely rugoso-punctate or reticulate; lateral faces of propodeum dull, densely tessellate, posterior face dull, very minutely and closely punctate, punctures rather vague, dorsal area velvety below, becoming finely and irregularly rugose along upper margin; basal abdominal tergum shining, coarsely and deeply punctate, punctures well separated medially, but becoming very close at extreme sides, apical margin abruptly depressed, yellowish-

hyaline, densely white fasciate, lateral margins of the dorsal face conspicuously white tomentose; transverse grooves of terga 2 and 3 very deep and complete sub-basal on 2 and subapical on 3, but becoming more nearly basal on each one at extreme sides, punctures on basal side coarse, deep, close and quite regular, apical margin of groove more or less impunctate, medially, becoming more coarsely and closely punctate at each extreme side, apical margins abruptly depressed, yellowish-hyaline, densely white fasciate, tergum 2 with a pair of much elongated and very narrow and deep foveae on each side, just apical to the groove; terga 4 and 5 white fasciate across base, apical margins deeply depressed and fasciate at extreme sides, punctures coarse, deep, distinct, close laterally, somewhat more widely separated medially; tergum 6 fasciate across base, surface densely and irregularly rugoso-punctate, rather finely so at sides, with a deep, median concavity, dorsal protuberances short, somewhat divergent, broadly rounded or subtruncate, the ventral spines more elongate and parallel, narrowly subtruncate apically, lateral spines rather elongate and slender (fig. 66); sterna 1-4 shining, coarsely, deeply and closely punctate, apical margins abruptly depressed, yellowish-hyaline, densely white fasciate on 2 and 3, fasciate toward sides on 4, disc of 4 not emarginate medially but the depressed margin with a very narrow emargination; sternum 5 largely retracted, apical margin slightly incurved medially, with a rather dense, apical fringe on each side; sterna 6 and 8 entirely retracted, 8 rather narrowly subtruncate apically; penis valves of genital armature fully equal to gonocoxites in length, the gonocoxites somewhat compressed, bearing copious elongate and erect pubescence.

DISTRIBUTION—British Columbia and California to Nova Scotia, the New England states, North Carolina and Georgia; June to October.

FLOWER RECORDS—*Asclepias, Baptisia, Helianthus, Melilotus, Rudbeckia, Solidago, Spiraea* and *Vicia*. Robertson (1929) lists the following additional plant genera: *Aster, Blephilia, Lobelia, Monarda, Petalostemum* and *Verbesina*.

HOSTS—*Megachile latimanus* Say and *M. melanophoea* Smith.

The subspecific designation of *rufitarsis* is made necessary by the present recognition of two additional subspecies in the western states.

Coelioxys sayi Robertson

(Figs. 63, 65 & 66)

Coelioxys sayi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 346. ♀ ♂.

Coelioxys mendacina Cockerell, 1921. Amer. Mus. Novitates 21, p. 3. ♀ ♂. New synonymy

Coelioxys sayi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9.5-12 mm.; black, tegulae more brownish-piceous, tibiae and tarsi more or less reddened; eyes very slightly convergent below; lateral ocelli subequally distant from margin of vertex and each other, this space not much greater than their diameter, considerably more distant from eyes; cheeks much narrower than eyes, subangulate and slightly concave below, but this area not sharply differentiated from that above; clypeus rather flat toward upper margin but much thickened apically, the margin somewhat incurved medially, forming two rather obtuse, rounded angles; median length of labrum slightly greater than basal width; upper margin of mandible rather broadly produced toward base, the median tooth rather small but distinct; punctures quite coarse and deep, rather sparse between eyes and ocelli, somewhat closer along posterior border of vertex, contiguous on cheeks, irregular and coarse just below anterior ocellus, becoming very densely and finely rugose between and below antennae and over clypeus, a quite distinct, raised, impunctate, longitudinal line between antennae; pubescence of head and thorax entirely pale, more or less yellowish, rather copious around antennae and below ocelli, but becoming subappressed and very short on supraclypeal area and clypeus, somewhat more elongate on each side of face, the apical thickened margin of the clypeus with very dense, elongate, pale yellowish pubescence; pubescence of cheeks very short, somewhat more dense toward hypostomal area, quite short and sparse over most of pleura, becoming somewhat more dense anteriorly and posteriorly, but not forming distinct fringes; propodeum with copious elongate, pale yellowish pubescence; transverse carinae of tubercles low but evident, extended slightly along anterior margin of scutum; scutellum rather broadly outcurved posteriorly, posterior and dorsal surfaces not sharply differentiated; axillae very short, not much longer than basal width, acute tip projecting but very slightly beyond margin of scutellum; coxal spines very short, reduced to subtriangular, carinate tubercles; wings quite deeply infuscated, 2nd recurrent vein reaching 2nd submarginal cell much nearer apex than 1st does to base; scu-

tum coarsely and deeply punctate, punctures slightly separated medially but becoming crowded laterally; punctures of scutellum coarse, slightly separated, those on axillae about equally coarse but very close; punctures of pleura very coarse, contiguous and rather shallow, becoming subreticulate above; lateral faces of propodeum smooth but very dull, posterior face somewhat more shining, with minute, scattered and vague punctures, dorsal area velvety, becoming obscurely subreticulate along upper margin; basal abdominal tergum shining, punctures coarse and deep, rather widely separated medially, becoming quite close and somewhat finer laterally, apical margin slightly depressed, with an entire, dense, white fascia; transverse grooves of terga 2 and 3 subapical medially, becoming more basal toward sides, the more basal punctures of the discs quite deep, distinct, rather coarse and regular, apical areas largely impunctate medially, becoming rather closely punctate at extreme sides, apical margins deeply depressed and completely white fasciate; terga 4 and 5 not definitely grooved, rather closely punctate basally, more sparsely so apically, the apical margins deeply depressed and completely white fasciate; tergum 6 abruptly narrowed just beyond mid point, thus obtusely angulate, closely, deeply and rather finely punctate between this and base, with a faint, median, longitudinal line which continues as a distinct ridge to apex, surface deeply excavated on each side of this and sides just beyond the angle rather deeply excavated, tip very narrowly rounded (fig. 65); sternum 6 narrow and elongate, gradually narrowed apically, with a pair of very minute but distinct notches on each side toward tip, this area slightly longer than breadth at the notches, subacute apically; sterna 1-4 shining, coarsely and deeply punctate, rather uniformly close in large part, apical margins depressed, yellowish-hyaline, completely white fasciate; sternum 5 subtriangular in outline, basal punctures quite deep and distinct, but apex becoming dull, finely and densely tessellate or roughened, punctures fading out from base, lateral oblique margins quite distinctly white fasciate.

MALE—Length 9-10 mm.; black, tegulae yellowish-hyaline, tarsi entirely, and tibiae at base and apex, ferruginous; eyes rather strongly convergent below; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks somewhat narrower than eyes, carinate posteriorly, deeply concave over most of lower half adjacent to the carinate posterior margin, this carina produced below into an obscure angle, the concavity shining and bare; clypeus very slightly convex, apical margin nearly straight, densely covered with pubescence; median length of labrum about equal to basal width; median tooth of mandible distinct; punctures coarse and deep, rather close behind ocelli, but with wide, intervening, impunctate spaces between ocelli and eyes, cheeks becoming coarsely rugoso-punctate or reticulate, area below ocelli coarsely reticulate, becoming very densely rugose beneath the pubescence below antennae and over clypeus; pubescence entirely white on head and thorax, dense below antennae and along margins of hypostome; pleura with rather short, thin pubescence, forming indefinite, white fringes along margins; pubescence of propodeum more elongate and thin; transverse carina of tubercles very low and inconspicuous, somewhat obscured by pubescence; posterior margin of scutellum very slightly outcurved, posterior and dorsal surfaces not sharply differentiated; axillae subtriangular, very short, not much longer than the base is broad, projecting only slightly beyond margins of scutellum; coxal spines well developed, elongate, somewhat spatulate, with rounded tips, densely pubescent posteriorly; wings rather deeply infuscated over apical half, 1st recurrent vein reaching 2nd submarginal cell nearer base than 2nd does to apex; scutum coarsely and deeply punctate, punctures slightly separated medially, becoming densely crowded at extreme sides; scutellum coarsely rugoso-punctate or reticulate, the axillae somewhat more finely so; punctures of pleura rather shallow but coarse and subcontiguous, with a few shining interspaces evident below, becoming coarsely reticulate above; lateral faces of propodeum dull, very finely roughened, posterior face somewhat more shining, with very minute, close and vague punctures, dorsal area narrowly velvety below, the upper half becoming finely and obscurely rugose; basal abdominal tergum shining, punctures coarse, deep and quite close, only slightly separated medially, apical margin depressed, yellowish-hyaline and completely white fasciate; transverse grooves of terga 2 and 3 complete, subapical in position at center, becoming more basal at extreme sides, the more basal punctures deep, regular and quite coarse, the more apical part of disc shining and impunctate in large part, becoming rather irregularly and closely punctate at extreme sides; tergum 2 with a pair of very small, but deep and distinct foveae on each side, just beyond the groove, apical margins of both terga deeply and narrowly depressed, yellowish-hyaline and white fasciate; terga 4 and 5 somewhat depressed at base, this area white tomentose, interrupted medially, apical margins deeply and abruptly depressed, more or less hyaline, white fasciate at sides, interrupted medially on each, discs deeply and rather coarsely punctate medially,

where they are rather sparse, but becoming closer and finer toward lateral limits; tergum 6 fasciate at base on each side of center, surface somewhat shining, closely, finely and distinctly punctate, deeply excavated just before tip, dorsal protuberances flared, very short, subtriangular, ventral spines more narrow and elongate, tips narrowly rounded, lateral spines distinct and acute (fig. 66); sterna 1-4 shining, coarsely, deeply and rather uniformly punctate, punctures only slightly separated in general, apical margins depressed yellowish-hyaline, completely white fasciate; disc of sternum 4 not appreciably emarginate medially, but the depressed rim with a very small, median, apical emargination; sternum 5 largely retracted, the margin broadly and shallowly incurved medially, submembraneous, rather densely tomentose on each side; sterna 6 and 8 entirely retracted, 6 triangularly acute apically, rather densely long pubescent on each side, 8 strongly narrowed apically, the tip slightly incised; gonocoxites of genital armature much exceeding penis valves in length, somewhat compressed, bearing numerous, rather elongate, erect, fine hairs.

DISTRIBUTION—British Columbia to Ontario, south to Texas and Florida; March to October.

FLOWER RECORDS—*Afzelia, Aralia, Asclepias, Aster, Bidens, Coreopsis, Daucus, Erigeron, Haplopappus, Helenium, Helianthus, Koellia, Lespedeza, Linaria, Melilotus, Nepeta, Phaseolus, Polygonum, Rhus, Rubus, Solidago, Spiraea, Trifolium* and *Vicia*. Robertson (1929) lists the following additional genera: *Amorpha, Blephilia, Crotalaria, Dianthera, Eryngium, Eupatorium, Geranium, Heliopsis, Monarda, Petalostemum, Psoralea, Rudbeckia, Symphoricarpus, Thaspium* and *Verbena*.

HOST—*Megachile mendica*.

This parasite has been reared from a nest of *Megachile mendica* by K. V. Krombein at Lake Placid, Fla.

Coelioxys slossoni arenicola Crawford

(Figs. 65 & 66)

Coelioxys slossoni var. *arenicola* Crawford, 1914. Ent. Soc. Amer. Ann. 7, p. 156. ♀ ♂.

FEMALE—Length 12 mm.; black, tegulae yellowish-hyaline, mandibles except the teeth, labrum in part, legs except coxae, basal abdominal tergum and all of the sterna, ferruginous; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, considerably more distant from eyes; cheeks very narrow above, becoming even narrower below, neither angulate nor excavated below; clypeus flat, apical margin straight, densely fringed with elongate, densely plumose pubescence; median length and basal width of labrum subequal; median tooth of mandibles conspicuous; punctures deep and distinct, slightly separated across vertex and between ocelli, a shining, slightly elevated, impunctate space between upper end of eye and lateral ocelli, and a similar elevated impunctate area more or less surrounding anterior ocellus and extending down nearly to level of antennae; other areas of face and clypeus beneath pubescence finely rugose, cheeks rather coarsely rugoso-punctate, becoming finely so below; pubescence of head and thorax entirely pale, very short, subappressed and pale yellowish on face and clypeus, more whitish on cheeks, pleura prominantly fringed on both margins with dense, whitish pubescence, the scutello-mesothoracic suture with a dense and conspicuous line of yellowish tomentum, the lateral margins adjacent to tegulae, yellowish tomentose, and scutum with a pair of anterior, transverse, tomentose bands which are slightly separated medially; pubescence of propodeum rather short but copious, entirely yellowish-white and erect; transverse carinae of tubercles erect and conspicuous, extended somewhat along anterior margin of scutum; posterior margin of scutellum slightly outcurved, posterior and dorsal faces quite distinct; axillae rather short but acute, projecting rather conspicuously from margin of scutellum, length not exceeding median length of scutellum; front coxal spines reduced to very low, triangularly carinate tubercles that are densely pubescent posteriorly; wings subhyaline basally becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum coarse, deep and distinct, rather uniformly close but not crowded; dorsal face of scutellum irregularly and closely punctate, with some irregular intervening spaces evident; axillae coarsely and closely punctate or reticulate; pleura below shining, punctures variable and irregular, of two rather distinct sizes, with evident, shining, intervening spaces, becoming quite coarsely reticulate just below tegulae; lateral faces of propodeum somewhat smoother but very dull, minutely, obscurely and closely punctate, posterior face somewhat more shining, punctures irregularly scattered and very minute, dorsal area more shining or velvety, becoming rather deeply and coarsely but narrowly striate along upper margin; basal abdominal tergum shining, entirely ferruginous, punctures deep, distinct, quite coarse and sparse, becoming finer and closer toward the slightly depressed, apical

rim, this with an entire, rather narrow, pale yellowish fascia; transverse grooves of terga 2-4 sub-basal and quite evident toward the sides but obliterated medially, punctures basad of the grooves, rather deep, distinct, close and rather coarse, only slightly separated in median area, the more apical portions of the discs beyond the grooves largely shining and impunctate, but with punctures becoming evident toward the rims and toward the lateral margins, apical rims depressed, with entire, pale yellowish fasciae; tergum 5 somewhat depressed toward base and rather closely punctate across base, becoming very sparsely punctate medially, punctures becoming more numerous toward the depressed rim and the extreme sides, the rim bearing a nearly complete, dense, pale yellowish fascia; tergum 6 elongate triangular in outline, slightly incurved near center of each side, the sides slightly excavated at this point, but not at all angulate, a narrow, median, longitudinal, impunctate line from base continuous with a distinctly raised, median ridge toward apex, surface slightly but not deeply excavated on each side, tip very narrowly rounded, the more basal punctures fine, well separated medially, becoming somewhat closer toward sides and apically, the tip dull but rather smooth (fig. 65); sternum 6 narrow and elongate, somewhat exceeding the tergum in length, with a pair of distinct notches toward the tip, length of this apical part considerably greater than width at the notches, tip narrowly rounded; sterna 1-4 shining, ferruginous, with deep, distinct and well separated punctures, these becoming somewhat closer at extreme sides, apical margins depressed, yellowish-hyaline, loosely white fasciate; sternum 5 broadly triangular in outline, closely punctate at base but punctures becoming minute and indefinite toward the apical, angulate tip, the oblique sides with a rather dense but narrow fringe of whitish pubescence.

MALE—Length 12 mm.; black, tegulae ferruginous-hyaline, mandibles except tips, entire legs except coxae, basal abdominal tergum and most of the abdominal sterna bright ferruginous; eyes rather strongly convergent below; lateral ocelli subequally distant from eyes and margin of vertex, slightly nearer each other; cheeks considerably narrower than eyes, carinate posteriorly, shallowly excavated or concave below, but this area densely tomentose, with an elongate posterior fringe; clypeus nearly flat, margin nearly straight; median length of labrum somewhat greater than basal width; median tooth of mandible very low and inconspicuous, hardly evident; punctures deep and distinct, slightly separated but not sparse across vertex, a narrow, shining, impunctate, somewhat raised space between upper end of eye and lateral ocelli, and anterior ocellus partially surrounded by a similar raised impunctate area; cheeks rather finely rugose, becoming closely but more distinctly punctate above; surface of face and clypeus beneath the dense pubescence very finely rugose; pubescence very short, entirely pale on head and thorax, yellowish and rather copious around antennae, becoming appressed and dense over entire lower half of face and clypeus, cheeks more thinly white pubescent, quite dense on each side of hypostome; margins of pleura fringed with dense, whitish pubescence, the scutello-mesothoracic suture quite densely yellowish tomentose, lateral margins of scutum similarly tomentose and scutum with a pair of transverse, anterior lines of yellowish tomentum that are nearly or quite contiguous medially; pubescence of pleura more erect and thin, largely yellowish-white; transverse carinae of tubercles erect and conspicuous, yellowish-hyaline, produced slightly along anterior margin of scutum; posterior margin of scutellum gently outcurved, the posterior and dorsal faces quite distinct; axillae prominantly produced apically, this projection strongly compressed and rounded as seen from the side, acute as seen from above; coxal spines well developed, slender, moderately elongate, narrowly rounded at tip, the coxae completely covered with dense, whitish pubescence; wings subhyaline basally, becoming lightly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum shining between coarse, deep and distinct punctures, these slightly separated over most of disc, but becoming somewhat closer at extreme sides and toward the transverse tomentose bands; dorsal face of scutellum and axillae closely and rather deeply punctate, punctures slightly but not widely separated, contiguous in part; pleura shining below, punctures of two distinct sizes, at least slightly separated, becoming coarsely reticulate above, just below tegulae; lateral faces of propodeum smooth but dull, minutely and obscurely punctate, posterior face somewhat more shining, punctures very fine, irregularly scattered and obscure, dorsal area velvety but somewhat shining, the narrow upper margin with a row of quite distinct, short striations; basal abdominal tergum entirely ferruginous, rather deeply, closely punctate medially, punctures becoming much more coarse and sparse toward each side, apical margin with a complete, pale yellowish fascia, the tergum subcarinate at each extreme side; transverse grooves of terga 2 and 3 obliterated medially, quite distinct laterally, sub-basal at extreme sides but becoming more nearly median toward the mid line, the more basal punctures of the disc rather deep, distinct, close laterally becoming

more widely separated medially, the apical margin of groove on each side rather narrowly shining and impunctate, disc rather deeply punctate between this and the depressed apical rims, these densely yellowish fasciate at the sides, becoming very thin or interrupted medially, groove of tergum 3 pale tomentose in part; terga 4 and 5 with basal transverse grooves, these densely tomentose, the more apical portions of the disc beyond these grooves impunctate in part, but becoming rather closely punctate along the depressed rims, these with apical fasciae evident at the sides; tergum 6 shining, densely tomentose across base, punctures very fine, irregularly scattered on the median area, becoming rather coarse on each side where they are to some degree separated, disc with a deep, median excavation just before tip, the dorsal protuberances slightly divergent, short but acute, ventral spines more elongate and slender, very slightly divergent, lateral spines short but distinct and acute (fig. 66); abdominal sterna 1-4 ferruginous, shining, deeply, distinctly and rather coarsely punctate, punctures only slightly separated in median area, close laterally, apical margins slightly depressed, yellowish-hyaline, densely clothed with rather loose, whitish pubescence; sternum 5 fully exposed, broadly rounded, apical median area shallowly depressed, apical margins depressed and distinctly fasciate on each side of center; sterna 6 and 8 entirely retracted, submembraneous, 8 strongly narrowed apically; penis valves of genital armature very short, considerably exceeded by the somewhat compressed gonocoxites, these with numerous, fine but rather elongate, erect hairs.

DISTRIBUTION—Texas to Georgia and North Carolina; June to September.

FLOWER RECORDS—*Helianthus, Phaseolus* and *Strophostyles.*

Coelioxys slossoni slossoni Viereck

Coelioxys slossoni Viereck, 1902. Canad. Ent. 34, p. 327. ♀ ♂.

This form is very similar to *arenicola,* showing no evident structural differences. In this typical form the abdomen is almost entirely ferruginous, lacking the black tergal plates of segments 2-6 of *arenicola.* In the male, also, there is a tendency to a more complete ferruginous color of the abdominal terga, but in some cases it is about the same as in *arenicola.*

DISTRIBUTION — Florida; March to September.

FLOWER RECORD—*Bidens.*

Coelioxys sodalis Cresson

(Figs. 65 & 66)

Coelioxys sodalis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 99. ♂.

Coelioxys tristis Provancher, 1882. Nat. Canad. 13, p. 241. ♀. New synonymy.

Coelioxys ribis Cockerell, 1900. Canad. Ent. 32, p. 301. ♀. New synonymy.

Coelioxys ribis var. *kincaidii* Cockerell, 1904. Ann. Mag. Nat. Hist. (7) 13, p. 33. ♀. New synonymy.

Coelioxys ribis Graenicher, 1927. Ent. News 38, pp. 233 & 273. (biology)

FEMALE—Length 11-13 mm.; entirely black, including tegulae and legs; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, and slightly nearer each other than to eyes; cheeks slightly narrower than eyes, carinate posteriorly, much narrowed and densely pubescent below, obscuring the inferior angle, clypeus nearly flat, apical margin straight, with 4 or 5 small denticles and a rather dense fringe of short, yellowish hairs interspersed with a few elongate hairs; median length of labrum subequal to basal width; mandibles quite slender, middle tooth about equal to the others; punctures quite coarse and deep, close but not crowded across vertex, becoming densely crowded on cheeks, coarsely reticulate just below anterior ocellus, face below antennae and clypeus finely sub-rugose; pubescence of head and thorax entirely pale, somewhat yellowish and quite dense on face, short and subappressed on clypeus, but more or less erect elsewhere, whitish and rather elongate on cheeks below, yellowish-white and rather copious on dorsum of thorax and on propodeum, somewhat more whitish but copious on pleura; transverse carinae of tubercles very low, barely evident beneath the dense pubescence; posterior margin of scutellum quite strongly outcurved, posterior face not sharply differentiated from dorsal face; axillae acute, rather slender apically, produced conspicuously from sides of scutellum, but tips not exceeding median length of scutellum; front coxal spines reduced to very short and inconspicuous, blunt tubercles; wings hyaline basally, becoming very faintly clouded along apical margin, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum slightly separated medially, rather shallow and not very sparse, becoming somewhat finer and densely crowded laterally; punctures of scutellum much coarser and contiguous, those on axillae much finer toward base, becoming inevident on the minutely roughened tips; punctures of pleura not especially coarse, slightly separated below, surface more reticulate above; lateral

faces of propodeum dull, finely reticulate, posterior face somewhat more finely reticulate, dorsal area smooth and velvety, but becoming rather broadly and very finely rugose along upper margin; basal abdominal tergum shining over the median 3rd, densely and copiously pale pubescent on each side, punctures very fine and rather sparse medially, becoming somewhat closer toward sides, apical margin only slightly depressed and subfasciate; transverse grooves of terga 2 and 3 submedian at mid-line, becoming more basal laterally, the more basal punctures quite deep, distinct and relatively close, the broader apical areas very sparsely, irregularly, and finely punctate, apical margins rather deeply depressed, with entire, whitish, apical fasciae; terga 4 and 5 sparsely and finely punctate except at extreme sides, apical margins very narrowly depressed and narrowly white fasciate; tergum 6 triangular in outline, the sides straight, very slightly grooved just beyond the mid point but neither incurved nor angulate, with a very fine, median, longitudinal ridge extending from near the base toward the tip, surface quite deeply excavated on each side near the tip which is narrowly rounded, surface somewhat shining at base, very finely and rather closely punctate, punctures becoming crowded toward apex which is more tessellate or subrugose (fig. 65); sternum 6 quite broad at base, abruptly narrowed toward the rather slender, narrowly rounded apex, the sides thus markedly incurved but not notched; sterna 1-4 rather sparsely and shallowly punctate medially, punctures becoming very close and relatively deep at sides, apical margins rather broadly impressed, yellowish-hyaline and rather densely white fasciate; sternum 4 triangular in outline, very finely punctate medially at base, becoming somewhat more coarsely so laterally, punctures becoming densely crowded, minute and obscure toward apex, the margins narrowly white fasciate.

MALE—Length 8-12 mm.; entirely black, including tegulae and legs; eyes somewhat convergent below; lateral ocelli slightly nearer margin of vertex than to each other, and considerably nearer each other than to eyes; cheeks subequal to eyes in width, not noticeably carinate posteriorly, with a rather deep, bare concavity below, upper margin produced rather conspicuously below lower end of eye as a distinct tubercle, lower margin with a fringe of elongate hairs; clypeus nearly flat, apical margin straight, with 5 small denticles, rather conspicuously fringed with elongate, pale hairs; median length of labrum subequal to basal width; mandibles rather slender, median tooth well developed; punctures quite coarse and deep, distinct and slightly separated in part across vertex, cheeks more densely rugose, and face below ocelli densely and rather finely rugose, especially below antennae and on clypeus; pubescence of head and thorax entirely pale and somewhat yellowish, quite long and copious around antennae, between ocelli and over lower part of face, more definitely white but rather short on cheeks, whitish and copious over pleura and propodeum, somewhat more yellowish, elongate and rather thin over dorsum of thorax; transverse carinae of tubercles very low and inconspicuous, barely evident, obscured by pubescence; posterior margin of scutellum rather broadly outcurved, posterior and lateral surfaces not differentiated; axillae acute apically, rather short, projecting but little from margin of scutellum; coxal spines short but well developed, rather robust, tips narrowly rounded, densely long pubescent posteriorly; wings subhyaline, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; punctures of scutum quite deep and distinct throughout, rather coarse and slightly separated medially, becoming much finer and densely crowded laterally; punctures of scutellum quite densely crowded, not much coarser than those of scutum; axillae with much finer and densely crowded punctures, being nearly rugose; pleura rugose or rather finely reticulate below, becoming more coarsely reticulate above; lateral faces of propodeum finely reticulate and dull, posterior face finely, obscurely and closely punctate, dorsal area smooth, more velvety, becoming very narrowly, irregularly striate along upper margin; basal abdominal tergum shining, punctures rather fine and close but deep and distinct, quite regular, surface bearing rather copious, elongate, white pubescence, apical margin narrowly depressed and rather loosely pale fasciate; terga 2 and 3 markedly depressed across base but without definite grooves, punctures deep and distinct but rather fine and close, evenly distributed in general, but becoming considerably finer and closer on each side of mid-line on tergum 2, foveae completely lacking, apical margins rather deeply depressed, narrowly yellowish-hyaline, with entire whitish fasciae; terga 4 and 5 rather evenly, deeply and distinctly punctate, rather closely so on 4, somewhat more sparse on 5, apical margins narrowly depressed, yellowish hyaline, with entire white fasciae; tergum 6 deeply excavated in center toward apex, dorsal protuberances very short, subtriangular, compressed and nearly parallel, overlying base of the ventral spines which are more elongate, the tips narrowly truncate, intervening space rounded, lateral spines robust, tips very slightly curved, surface of tergum shining, finely and closely punctate medially, punctures becoming somewhat coarser and more sparse on each side (fig. 66); sterna 1-4 shining, closely, deeply and not very

coarsely punctate, punctures evenly distributed, apical margins narrowly yellowish-hyaline, rather densely white fasciate; disc of sternum 4 not appreciably emarginate, but the depressed apical margin very slightly incurved medially; sternum 5 largely hidden, submembraneous, apical margin rather broadly and deeply incurved medially, densely pubescent on each side of this apically; sterna 6 and 8 entirely retracted, largely membraneous, 8 rather regularly rounded apically; penis valves of genital armature fully equal to the gonocoxites in length, gonocoxites slightly swollen, bearing numerous, elongate, erect hairs.

DISTRIBUTION—British Columbia and Northwest Territory to Nova Scotia, Wisconsin, New York and the New England states; May to August.

FLOWER RECORDS—*Rhodora* and *Rubus*.

HOST — *Megachile wootoni (melanophoea)* Smith.

Coelioxys texana texana Cresson
(Figs. 64-66)

Coelioxys texana Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 272. ♀.

FEMALE—Length 13 mm.; black, tegulae yellowish-hyaline, scape and pedicel of antennae, legs and venter of abdomen in large part ferruginous; eyes nearly parallel; lateral ocelli subequally distant from margin of vertex, from eyes and each other; cheeks very narrow, subcarinate posteriorly, carinate margin meeting the hypostomal carinae below at a distinct angle, this area not excavated; clypeus very slightly convex, apical margin nearly straight, very finely tuberculate, with a dense fringe of rather short, whitish pubescence; median length of labrum somewhat greater than basal width; median tooth of mandible somewhat smaller than the others; punctures quite deep and distinct, not very coarse, but well separated across vertex, becoming somewhat closer and more obscure on cheeks, area surrounding anterior ocellus markedly swollen and impunctate, a narrower impunctate band extending from this to upper margins of eyes; supraclypeal area rather deeply, distinctly and closely punctate, clypeus more irregularly rugose, with shining, irregular anastomosing lines; pubescence entirely pale, somewhat yellowish and rather copious around bases of antennae and on sides of face, very sparse and more whitish on cheeks; pubescence sparse on pleura, with thin fringes anteriorly and posteriorly, scutello-mesothoracic suture narrowly yellowish tomentose, posterior surface of scutellum densely tomentose and scutum with a pair of anterior, transverse curved lines of tomentum which are somewhat broader toward median line, with a few scattered, scale-like hairs between; propodeum with finer, more erect and elongate, quite dense pubescence; transverse carinae of tubercles erect and conspicuous, yellowish-hyaline, extending along anterior margin of scutum for a considerable distance; posterior margin of scutellum broadly angulate, posterior and dorsal surfaces quite sharply differentiated but not carinate; axillae well developed, acute apically, tips about equalling the median length of the scutellum (fig. 64); front coxal spines reduced to very short and inconspicuous, blunt or subcarinate tubercles; wings subhyaline at base becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum rather dull, punctures coarse, deep and distinct, slightly separated in the broad, median area, becoming very close laterally; punctures of scutellum somewhat smaller and closer than those of scutum, and axillae with a few, scattered, indistinct punctures; punctures of pleura rather shallow, coarse and widely separated in general, becoming close only just below the tegulae; lateral faces of propodeum rather smooth, surface obscured by rather dense pubescence, posterior face rather dull, with minute, indefinite, scattered punctures, dorsal area velvety, becoming quite deeply, abruptly and narrowly striate across upper margin; basal abdominal tergum shining, coarsely and deeply punctate, punctures slightly separated but not sparse throughout, margin of basal concavity conspicuously yellowish fasciate, and apical margin with an entire, narrow, yellowish fascia; terga 2 and 3 with submedian, slightly oblique, transverse grooves on each side, these widely interrupted medially, quite densely pale tomentose, forming a rather distinct, submedian fascia, punctures quite coarse and deep, well separated medially, becoming somewhat closer laterally, apical margins narrowly depressed, yellowish-hyaline, with entire yellowish fasciae; tergum 4 faintly impressed on each side, but not definitely grooved, with only a few scattered, scale-like hairs, punctures somewhat finer and closer at extreme base, becoming rather sparse and somewhat coarser toward depressed apical margin which has an entire, pale yellowish fascia; tergum 5 rather dull, punctures rather fine and close basally, becoming somewhat more sparse toward apical margin, this depressed and thinly, yellowish fasciate; tergum 6 rather broad at base, apex triangularly pointed, each side thus slightly outcurved, upper surface quite flat, rather dull, finely and closely punctate at base, punctures becoming more sparse apically, apical and sublateral margins bearing scattered, coarse and elon-

gate punctures, being almost striate (fig. 65); sternum 6 nearly parallel-sided, apex broadly rounded, produced considerably beyond apex of tergum; sterna 1-4 shining, deeply and coarsely punctate, punctures well separated medially, becoming closer laterally, apical margins rather broadly yellowish-hyaline and loosely white fasciate; sternum 5 broadly rounded apically, coarsely punctate across extreme base, but the median, apical areas with very minute and close punctures interspersed with somewhat coarser and more sparse punctures on a shining surface, thus doubly punctate, apical margin rather broadly hyaline, not definitely fasciate.

MALE—Length 11-12 mm.; black, tegulae yellowish-hyaline, scape and pedicel of antennae, legs and venter of abdomen in large part ferruginous; eyes slightly convergent below; lateral ocelli slightly nearer each other than to eyes, much nearer eyes than to margin of vertex; cheeks much narrower than eyes, inferior angle rounded, this area not excavated; clypeus slightly convex, apical margin nearly straight, with a pair of submedian tubercles which are slightly separated; median length of labrum somewhat greater than basal width; mandibles distinctly 3-dentate; punctures deep and distinct, rather coarse, slightly separated across vertex, becoming somewhat closer and rather obscure on cheeks, very fine and close below, surface becoming somewhat shining below mandibles; area surrounding anterior ocellus markedly swollen and impunctate and upper margin of eye with a similar impunctate area, these areas subcontiguous; punctures of face beneath the dense pubescence close and fine, clypeus somewhat more coarsely and irregularly, but deeply punctate; pleura sparsely pubescent with thin anterior and posterior fringes, the scutello-mesothoracic suture narrowly yellowish tomentose, posterior margin of scutellum densely tomentose, scutum with a pair of slightly curved, transverse, anterior lines of tomentum that are somewhat broadened at inner end, with a few, scattered, scale-like hairs between; pubescence of propodeum more erect and elongate, whitish, rather dense along posterior, lateral margins; transverse carinae of tubercles erect, well developed, yellowish-hyaline, extended considerably along anterior margin of scutum; posterior margin of scutellum broadly rounded or subangulate, posterior and dorsal faces quite sharply differentiated but not carinate; axillae quite robust, acute apically, tips not exceeding median length of scutellum; coxal spines reduced to acute tubercles; wings hyaline basally, becoming faintly infuscated apically, recurrent veins reaching 2nd submarginal cell subequally distant from base and apex; scutum somewhat shining, punctures coarse, deep and distinct, well separated across posterior half of disc and in center, becoming rather close but irregular at each side anteriorly; punctures of scutellum deep and distinct, somewhat finer and closer than those of scutum; punctures of axillae quite coarse, not very close; pleura somewhat shining below, punctures rather shallow but coarse, rather widely separated in general, becoming close only just below tegulae; lateral faces of propodeum dull, rather finely and deeply punctate beneath the copious pubescence, posterior face finely and closely punctate, dorsal area velvety, becoming irregularly and finely rugoso-striate along upper margin; basal abdominal tergum shining, punctures deep and distinct, rather coarse, well separated throughout, margin of concavity quite distinctly yellowish fasciate, but this interrupted medially, apical margin slightly depressed, with complete, whitish, apical fascia; tergum 2 with very short, transverse, subbasal grooves toward sides, these widely separated medially, filled with scale-like, pale pubescence forming an indefinite fascia, median punctures deep and distinct but very sparse, becoming quite fine and close between inner end of groove and the apical margin, but coarser and less close toward sides, apical margin deeply depressed and impunctate but not definitely fasciate; terga 3-5 with dense, basal fasciae which are interrupted medially, apical margins deeply depressed and impunctate, not fasciate, punctures coarse and sparse medially becoming quite close at extreme sides; tergum 6 fasciate across base, deeply excavated in center, dorsal protuberance irregular, short, somewhat flared and multidentate or crenulate, ventral spines short but acute, strongly divergent and widely separated, dorsal surface shining, rather deeply and finely punctate, punctures quite close within the central cavity (fig. 66); sterna 1-4 shining, deeply, coarsely, quite closely and regularly punctate, apical margins depressed, yellowish-hyaline, thinly whitish fasciate; depressed apical margin of sternum 4 with a rather deep, median emargination, acutely angulate on each side of this; sternum 5 largely retracted, apical margin very shallowly incurved medially; sterna 6 and 8 entirely retracted, submembraneous; gonocoxites slightly exceeding penis valves in length, somewhat swollen apically, bearing only extremely short, fine and obscure hairs toward apex.

DISTRIBUTION—Primarily southwestern, occurring in Mexico and Arizona, reaching Minnesota in the north and Florida in the south; March to September.

FLOWER RECORDS — *Acacia, Aster, Bidens, Borrichia, Cercocarpus, Coccoloba, Eriogonum, Gaillardia, Indigofera, Lepidium, Mimosa* and *Viguiera.*

Another form of this species, *vegana* Cockerell, has been described from New Mexico, making the subspecific designation of this typical form of *texana* desirable.

Table 7—Distribution of species of *Coelioxys* by states.

	New England						North Central						Mid Atlantic							South-eastern					
Coelioxys	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
alternata			X	X			X	X		X			X		X											X	X
a. wisconsinensis							X	X					X									X					
asteris																						X				X	X
atlantica				X		X		X	X	X			X			X						X					X
boharti																											X
comstockii													X														
dolichos																						X					X
floridana																						X					X
funerarea				X			X	X	X				X		X											X	
galactiae									X													X					X
germana									X	X	X	X		X					X		X	X				X	X
hunteri										X								X	X		X	X					X
immaculata				X						X			X									X				X	X
modesta				X			X	X		X	X		X	X	X							X		X		X	X
moesta	X			X		X	X	X		X									X								
obtusiventris																											X
8-dentata				X	X		X	X	X	X	X		X	X					X			X				X	X
piercei																						X					X
porterae	X			X		X	X	X										X				X					
rufitarsis	X	X	X	X	X	X	X	X	X	X	X		X		X	X						X				X	
sayi				X		X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
slossoni																											X
s. arenicola																						X	X			X	
sodalis	X	X					X	X					X														
texana																											X

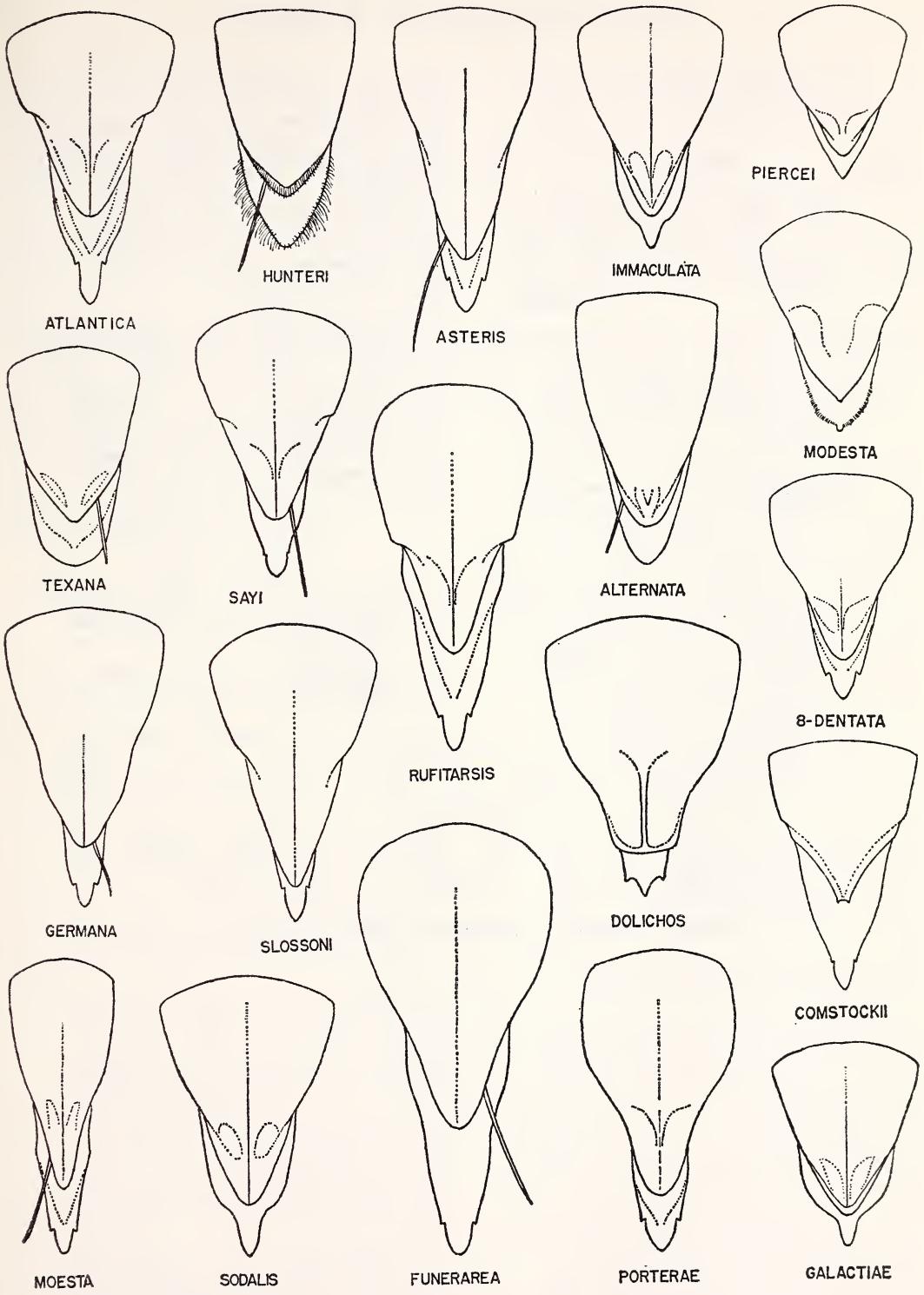


Figure 65—Apex of abdomen in females of *Coelioxys*.

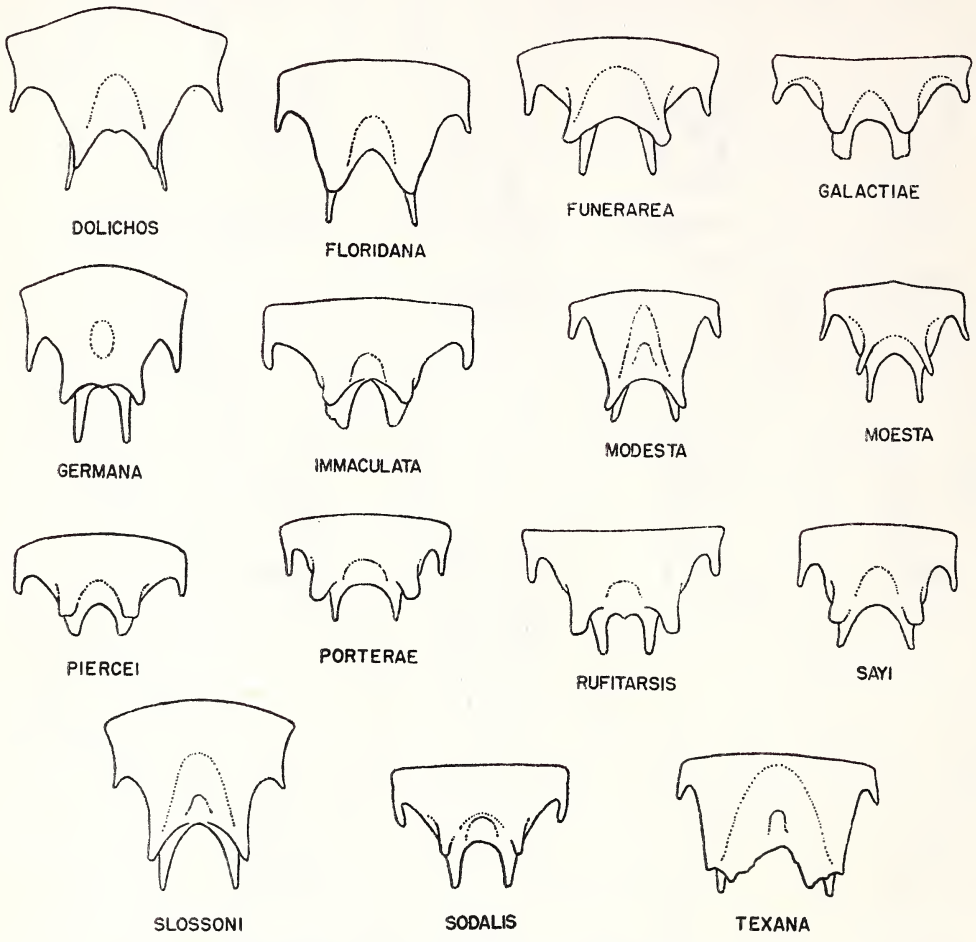


Figure 66—Apex of abdomen in males of *Coelioxys*.

FAMILY ANTHOPHORIDAE

The family Anthophoridae is a large and somewhat heterogeneous group of bees. Usually there are three submarginal cells in the front wing, but there are several exceptions to this rule, a few species in several genera having but two, and in *Neolarra* there is but one. The mouth parts are similar in general to those in the Megachilidae, with the glossa and the two more basal segments of the labial palpi much elongated. In the non-parasitic genera the pollen-collecting scopal hairs are located on the hind tibiae and basitarsi, but there are many parasitic groups in which the scopa is absent and the hind legs are relatively slender and wasp-like. There is usually a well defined pygidial plate at the apex of the abdomen in both sexes. In the males six sternal plates are exposed, with the 7th and 8th retracted and modified.

KEY TO GENERA

1. Front wing with but one submarginal cell, the marginal cell very small, the bounding vein extremely thick and heavy ..... *Neolarra* (p. 490)
   Front wing with two or three submarginal cells, the marginal cell of normal size 2

2. Front wing with but two submarginal cells 3
   Front wing with the usual three submarginal cells 4

3. Very small (5 mm. or less); antennae very close to upper margin of clypeus, much below mid transverse line of face ..... *Holcopasites* (p. 486)
   Much larger; antennae considerably removed from margin of clypeus, near or only slightly below mid-line of face 8

4(2). Second submarginal cell equalling or exceeding either the first or the third in length; stigma very small, length subequal to breadth; tip of marginal cell extending only slightly beyond apex of third submarginal 5
   Second submarginal cell usually shorter than both the first and the third submarginal; either the stigma well developed or the marginal cell extending considerably beyond apex of third submarginal 6

5. Scopa plumose; jugal lobe of hind wing about half as long as the vannal lobe; second submarginal cell exceeding the first and third in length ..... *Centris* (p. 333)
   Scopa simple; jugal lobe very short; second submarginal cell subequal to the third ..... *Anthophora* (p. 323)

6(4). Marginal cell very short, its apex barely attaining the apex of the third submarginal cell; scopa absent 7
   Marginal cell relatively long, its apex definitely extended beyond apex of third submarginal cell; scopa present or absent 8

7. Inner ramus of tarsal claws on mid and hind legs long and slender; maxillary palpi with 5 or 6 segments; abdominal terga chiefly black, without bands or spots of pale tomentum ..... *Melecta* (p. 492)
   Inner ramus of mid and hind tarsal claws short, lobe-like; maxillary palpi with 3 or 4 segments; abdominal terga with conspicuous spots or bands of cream-colored tomentum ..... *Xeromelecta* (p. 493)

8(6). Thorax and abdomen with red or yellow integumental maculations; scopa absent; pubescence very short and inconspicous ..... *Nomada* (p. 338)
   Integumental maculations absent or limited to the face; ornamentation of thorax or abdomen usually due to patterns of pubescense (if integumental bands present on abdomen, then pubescence is long and conspicuous) 9

9. Thorax and abdomen ornamented with bands and patches of dense appressed and very short yellowish or silvery tomentum, giving an appearance of integumental maculations; scopa absent 10
   Thorax and abdomen more or less clothed in longer and more erect pubescence 12

10. Abdomen in female sharply pointed at apex, without the false pygidium on fifth tergum; abdomen in male without a distinct pygidial plate ..... *Ericrocis* (p. 497)
    Abdomen in female rounded apically, fifth tergum with a more or less well developed false pygidium; pygidial plate in male well developed 11

11. Maxillary palpi 2-segmented; fifth abdominal tergum of female with an apical silvery lunule or pseudopygidial area; marginal cell about as long as distance from its tip to apex of wing ..... *Epeolus* (p. 438)

Maxillary palpi 3-segmented; fifth abdominal tergum of female with a quite extensive pseudopygidium; marginal cell considerably longer than distance from its tip to apex of wing .... *Triepeolus* (p. 459)

12(9). Vertex convex; male clypeus entirely black 13
Vertex flattened or concave between eyes and ocelli; male clypeus yellow at least in part 15

13. Scopa absent; apex of marginal cell obliquely truncate; basal segment of flagellum in male subequal in length to second segment ... *Epeoloides* (p. 490)
Scopa present; apex of marginal cell acute, slightly removed from costa; basal segment of flagellum in male exceeding segments 2-3 combined in length. 14

14. Pulvilli (arolia) present .... *Melitoma* (p. 242)
Pulvilli absent ..... *Ptilothrix* (p. 240)

15(12). Third submarginal cell about as broad as it is long, and only slightly exceeding the second submarginal in length ..... *Emphoropsis* (p. 331)
Third submarginal cell considerably longer (measured along cubitus) than broad and distinctly longer than second submarginal cell 16

16. Clypeal margin trilobed .... *Cemolobus* (p. 249)
Clypeal margin entire 17

17. Stigma well developed, much longer than broad; jugal lobe of hind wing short, less than half the length of vannal lobe ..... *Exomalopsis* (p. 235)
Stigma small, little if any longer than broad 18

18. Males 19
Females 26

19. Basal segment of flagellum at least equal in length to segment 2 20
Basal segment of flagellum much shorter than segment 2 21

20. Clypeus laterally distinctly separated from margin of eye .... *Xenoglossa* (p. 246)
Clypeus contiguous with eye laterally .. .. *Anthedonia* (p. 251)

21(19). Sternum 7 with an apical protuberance terminating a median ridge .... *Florilegus* (p. 253)
Sternum 7 neither protuberant nor ridged 22

22. Tergum 7 with a pair of robust, basal spines on each extreme side .... *Melissodes* (p. 263)
Tergum 7 not spinose 23

23. Tergum 6 with pronounced lateral angles or spines; clypeus laterally contiguous with eye 24
Tergum 6 neither angulate nor spined; lateral margins of clypeus usually somewhat separated from margin of eye.. 25

24. Gonostyli of genital armature equal to gonocoxites in length; maxillary palpi 5 or 6-segmented.. *Xenoglossodes* (p. 311)
Gonostyli straight, shorter than gonocoxites; maxillary palpi 3 or 4-segmented ..... *Svastra* (p. 255)

25(23). Antennae relatively short, length of median segments no more than twice the breadth ..... *Peponapis* (p. 244)
Antennae elongate, length of median segments fully three times the breadth.. ..... *Tetralonia* (p. 312)

26(18). Mandible bidentate apically .... *Peponapis* (p. 244)
Mandible simple or entire apically 27

27. Mandible with an angle or tooth on inner margin, either toward base or toward apex 28
Mandible entirely simple along inner margin 29

28. Mandible with a sub-basal angle about one-third from base .... *Xenoglossa* (p. 246)
Mandible with a small, subapical tooth or angle ..... *Florilegus* (p. 253)

29(27). Clypeus laterally distinctly separated from margin of eye, the resulting space greater than malar space 30
Clypeus laterally contiguous with margin of eye 32

30. Maxillary palpi 6-segmented .... *Tetralonia* (p. 312)
Maxillary palpi 5-segmented 31

31. Clypeus and labrum entirely black .... *Peponapis* (p. 244)
Clypeus apically and entire labrum, yellow ..... *Xenoglossa* (p. 246)

32(29). Scopa plumose 33
Scopa simple, or at least not visibly plumose 34

33. Metanotum with a median dense tuft of elongate hairs, the more lateral hair shorter ..... *Svastra* (p. 255)
Metanotum rather thinly pubescent, without a median tuft .... *Melissodes* (p. 263)

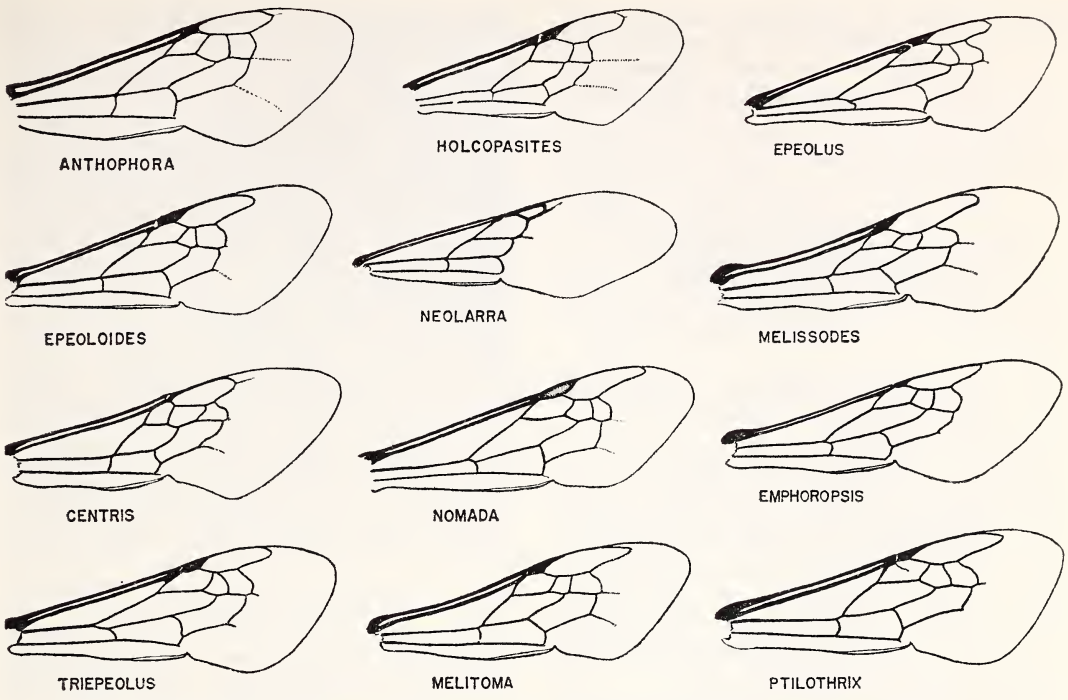


Figure 67—Venation of front wing in genera of the Anthophoridae.

34(32). Tegulae strongly constricted anteriorly, the outer margin of anterior half slightly incurved . *Melissodes* (p. 263)
Tegulae broadly rounded not at all constricted anteriorly 35

35. Abdominal fasciae terminal on each tergum .....*Xenoglossodes* (p. 311)
Abdominal fasciae usually median in position ..... *Anthedonia* (p. 251)

Exomalopsis Spinola
(Fig. 69)

Exomalopsis Spinola, 1853. Accad. Sci. Torino Mem. (2) 13, p. 89. Type: *(Exomalopsis fulvopilosa* Spinola) = *Exomalopsis aureopilosa* Spinola. Desig. by Taschenberg, 1883.
Anthophorula Cockrell, 1897, N. Mex. Agr. Exp. Sta. Bul. 24, p. 44. Type: *Anthophorula compactula* Cockerell. Monob.
Diadasiella Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 64. Type: (*Diadasiella coquilletti* Ashmead) = *Synhalonia albicans* Provancher. Monob. and orig. desig.
?Epimonispractor Holmberg, 1903. Buenos Aires Mus. Nac. de Hist. Nat. An. (3) 2, p. 426. Type: *Epimonispractor gratiosus* Holmberg. Orig. desig.
Exomalopsis subg. *Pachycerapis* Cockerell, 1922. Amer. Mus. Novitates 47, p. 4. Type: *Exomalopsis cornigera* Cockerell. Orig. desig.
Exomalopsis Timberlake, 1947. N. Y. Ent. Soc. Jour. 55, pp. 85-106. (revision)
Exomalopsis Michener and Moure, 1957. Amer. Mus. Nat. Hist. Bul. 112, pp. 427-434. (subgenera).

This genus of small anthophorid bees is primarily neotropical in distribution but is rather well represented in the Western United States, and four species have been collected in the eastern states. It differs from most other anthophorid bees in having a quite flat clypeus, this black in females, yellow or white in males of some species. Also, the well developed stigma is unusual. The marginal cell is quite large and elongate, the apex bent obliquely away from the coastal margin of the wing. The 2nd submarginal cell is much shorter than the 1st or 3rd. The hind tibiae and basitarsi have a very dense and conspicuous scopa of densely plumose hairs.

KEY TO SPECIES

1. Females 2
Males 5

2. Mesopleura dull, punctures close and rather coarse; stigma of front wing nearly or quite as long as length of marginal cell on wing margin 3

Mesopleura shining, punctures either very minute or quite widely separated; stigma of front wing much shorter than length of marginal cell on wing margin 4

3. Scutellum and posterior portion of scutum shining and nearly impunctate; scopal hairs on hind basitarsi black.. ..... *pulchella* Cresson (p. 238)
Scutellum and posterior margin of scutum closely and finely punctate; scopal hairs on hind basitarsi pale yellow.... ..... *similis* Cresson (p. 239)

4(2). Punctures of clypeus and mesopleura very minute and sparse, no coarser than those of face above antennae and dorsum of thorax .... *micheneri* Timberlake (p. 237)
Punctures of clypeus and mesopleura quite coarse, close and deep, much coarser than those on face above and on dorsum of thorax.. *asteris* new species (below)

5(1). Clypeus entirely yellow; mid antennal segments distinctly longer than broad ..... *asteris* new species(below)
Clypeus dark at least in part 6

6. Clypeus with an apical, triangular, cream-colored maculation; length and breadth of median flagellar segments about equal .. *micheneri* Timberlake (p. 237)
Clypeus entirely black, with rather copious and elongate pale pubescence; median flagellar segments somewhat longer than broad 7

7. Scutellum and posterior portion of scutum shining and nearly impunctate; mid and hind tibiae with some elongate black hairs toward base .... *pulchella* Cresson (p. 238)
Scutellum and posterior margin of scutum closely and finely punctate; pubescence of mid and hind tibiae entirely pale.. ..... *similis* Cresson (p. 239)

Exomalopsis (Anthophorisca) asteris new species

(Fig. 68)

FEMALE—Length 6.5 mm., breadth of abdomen 2.5 mm.; black, the antennal flagellum brownish, mandibles dark red, apical tarsal segment testaceous, spurs pale yellow; tegulae black; wings hyaline, veins testaceous to brownish; cheeks slightly narrower than eyes; clypeus rather flat, its median length nearly half the distance between eyes below; eyes slightly convergent below; mandibles simple; labrum quite broadly rounded apically, its median length about half the basal width; basal segment of flagellum slightly longer than pedicel, slightly shorter than segments 2 and 3 combined, median segments about as broad as long; lateral ocelli about equally distant from eyes and each other; basitibial plate very small, broadly rounded, much broader than long; basal abdominal tergum not carinate basally; surface in general smooth and shining, punctures very minute and sparse on vertex and face above antennae, rather coarse and close on clypeus, those on scutum quite deep, distinct and rather close anteriorly, becoming minute and very sparse posteriorly, minute and rather sparse also on scutellum and propodeum, but pleura with quite coarse, close and deep punctures; abdominal terga shining, the punctures very minute and rather widely separated on 1 and 2, uniformly very fine and close on basal halves of 3-5, apical halves slightly depressed and more minutely punctate beneath the pale tomentum; pygidium subtriangular, apex rather narrowly rounded; pubescence quite short but rather copious over head and thorax, entirely pale, quite dense across face just above antennae, copious on pleura, on scutellum posteriorly and to some degree on scutum anteriorly, tinged with yellow on dorsum of thorax, more whitish laterally and below, entirely pale on front and mid pair of legs, the hind tibial scopa whitish, becoming fuscous on basitarsi, hairs quite densely plumose; pubescence of abdominal terga largely pale, rather copious and erect but short on basal abdominal tergum anteriorly, very short and inconspicuous on the discs medially, apical impressed areas of terga 3 and 4 completely whitish tomentose, forming broad, whitish fasciae, that on tergum 2 broadly interrupted medially, basal tergum with a tomentose patch on each extreme side, discal pubescence very thin and hardly evident; apical fascia of tergum 5 formed of more elongate, yellowish hairs; and tergum 6 brownish pubescent on each side of pygidium.

MALE—Length 6-6.5 mm., breadth of abdomen 2 mm.; black, antennal flagellum testaceous beneath, brownish above, mandibles piceous, clypeus and labrum yellow, apical tarsal segments testaceous, spurs pale yellow, tegulae black; wings hyaline, veins testaceous to brownish; cheeks slightly narrower than eyes; clypeus rather flat, its median length slightly more than half the distance between eyes below; eyes convergent below; mandibles simple; labrum broadly rounded apically, its median length about half the basal width; basal segment of flagellum slightly shorter than pedicel, and slightly shorter than segment 2, following segments somewhat more elongate; lateral ocelli very slightly nearer eyes than to each other; basal abdominal tergum not carinate basally; surface in general smooth and shining, punctures very minute and sparse over

most of head, but closer around antennae, those on scutum fine and sparse, those on scutellum and pleura closer and coarser, those on propodeum very minute and well separated; abdominal terga less shining, punctures closer and deeper, very fine and well separated on basal tergum, but becoming quite coarse and almost crowded on the more apical terga, apical margins of all broadly but very shallowly depressed; pubescence quite short but rather copious over head and thorax, entirely pale, copious on pleura, on scutellum posteriorly, and to some degree on scutum, tinged with yellow on dorsum of thorax, more whitish laterally and below, entirely pale on legs; pubescence of abdominal terga darker in color and largely pale, rather copious and erect on basal abdominal tergum anteriorly, very short and inconspicuous on discs medially, apical impressed areas of terga 3 and 4 covered with white tomentum, forming broad, whitish fasciae, that on 2 broadly interrupted medially; sterna 7 and 8 and genital armature as shown (fig. 68).

TYPES—Holotype: Female, Brazos Co., Texas, October 10, 1954 (A. H. Alex, on *Aster*). Allotype: topotypical [both Tex. Agr. Exp. Sta.]. Paratypes: 5 ♀♀, 2 ♂♂, topotypical; 1 ♀, Hovey Lake Ent. Recon. Station 17, Indiana, Oct. 3, 1958 (L. C. Chandler).

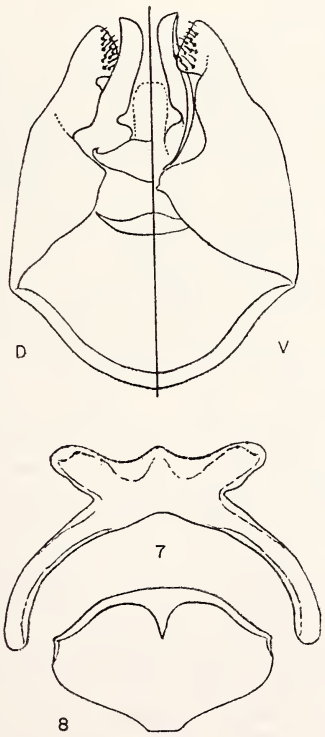


Figure 68
Genital armature and sterna 7 and 8 of *Exomalopsis asteris*.

Paratypes are in the Texas Agricultural Experiment Station, and in collections of Purdue University, P. H. Timberlake and the author.

Exomalopsis (Anthophorisca) micheneri Timberlake

Exomalopsis (Anthophorula) micheneri Timberlake, 1947. N. Y. Ent. Soc. Jour. 55, p. 105. ♀ ♂.

FEMALE—Length 6.5 mm., breadth of abdomen 2.5 mm.; black, the antennae and mandibles becoming somewhat more brownish-testaceous apically, the apical tarsal segments brownish-testaceous, spurs pale yellow; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to brownish; cheeks considerably narrower than eyes; clypeus slightly protuberant, its median length not much more than one-third the distance between eyes below (fig. 69); eyes very slightly convergent below; mandibles simple; labrum quite broadly rounded apically, its median length about half the basal width; basal segment of flagellum subequal to the robust pedicel, about equal to 2 and 3 combined, median segments about as broad as long; lateral ocelli slightly nearer eyes than to each other; basitibial plate rounded and quite short, somewhat broader than long; surface in general smooth and shining, punctures very minute and sparse over entire head, those on scutum quite deep, distinct and rather close anteriorly, becoming minute posteriorly, the scutellum, propodeum and pleura with very minute and quite sparse punctures; abdominal terga shining, the punctures very minute, somewhat more distinct and rather widely separated on basal tergum basally, very minute on the following terga, becoming somewhat more distinct and densely crowded on the more apical terga; pygidium subtriangular, apex rather narrowly rounded; pubescence quite short but rather copious over head and thorax, entirely pale, quite dense across face just above antennae, copious on pleura above, on scutellum, and to some degree on scutum where it is considerably shorter, tinged with yellow on dorsum of thorax, more whitish laterally and below, entirely pale on legs, the hind tibial scopa whitish, hairs quite densely plumose; pubescence of abdominal terga largely pale, rather copious and erect but short on basal abdominal tergum anteriorly, very short and inconspicuous on the discs medially, apical impressed areas of terga 3 and 4 completely whitish tomentose and that on tergum 2 whitish tomentose at extreme sides but broadly

bare or sparsely pubescence medially, the discal pubescence very thin and somewhat dark; tergum 5 with somewhat yellowish pubescence, with some more elongate whitish hairs laterally, not definitely fasciate; and tergum 6 brownish pubescent on each side of pygidium.

MALE—Length 5 mm.; black, the labrum and triangular apical maculation of clypeus cream-color; flagellum testaceous beneath, piceous above, median segments with length and breadth about equal, segment 2 very short, segment 1 about twice as long as segment 2; cheeks narrower than eyes; surface of head smooth and shining, finely and sparsely punctate; thorax shining, minutely and sparsely punctate; tegulae yellowish-hyaline; wings hyaline, veins and stigma testaceous; thoracic pubescence thin but erect, entirely whitish, rather long on scutellum, that on head entirely pale, rather long and erect on vertex and above antennae, shorter on cheeks and below antennae, quite dense on clypeus, but surface not obscured; abdominal terga shining, finely and regularly punctate, interspaces much greater than diameter of punctures on the more basal segments, becoming more close and deep on basal part of the more apical segments; basal segments of legs black, the tarsi becoming yellowish apically, pubescence entirely pale; spurs pale yellowish.

DISTRIBUTION—Mississippi, in October.

FLOWER RECORD—*Gerardia.*

Exomalopsis (Exomalopsis) pulchella Cresson

Exomalopsis pulchella Cresson, 1865. Ent. Soc. Phil. Proc. 4, p. 191. ♀ ♂.

FEMALE—Length 6.5 mm., breadth of abdomen 2.8 mm.; black, antennal flagellum piceous; mandibles testaceous apically; tarsal segments 2-5 testaceous; spurs yellowish; tegulae piceous; wings subhyaline, infuscated apically, stigma brownish, veins pale yellowish; cheeks narrower than eyes; clypeus quite flat; mandibles simple; labrum broadly rounded, median length about one-third the breadth; basal segment of flagellum slightly longer than segment 2, median segments slightly longer than broad; space between lateral ocelli about twice that between ocelli and eyes; hind basitibial plate quite large, rounded, length about equal to basal width; surface of face smooth but rather dull, punctures sparse but deep and distinct on clypeus; cheeks more shining, punctures sparse, minute and obscure; dorsum or thorax smooth but rather dull, punctures fine and rather close but deep and distinct on scutum anteriorly and laterally, very minute and sparse over posterior half and on scutellum, quite close and rather coarse but deep and distinct on pleura anteriorly and below, becoming minute and sparse posteriorly; lateral faces of propodeum dull, punctures close but minute and obscure, posterior face shining above, becoming finely, closely and distinctly punctate on each side; basal abdominal tergum smooth and impunctate, with a distinct basal carina separating the anterior and dorsal surfaces, following segments impunctate apically, segment 2 at least minutely and sparsely punctate basally; sterna quite closely and deeply punctate; pubescence short, thin and entirely pale on face and cheeks, more copious and entirely pale on thorax laterally and beneath, fuscous on scutum and scutellum, but becoming pale on scutum anteriorly, scutellum with a dense marginal fringe of pale yellowish hairs; legs pale pubescent, but hind tibial scopa with some dark hairs at base, and basitarsal scopa blackish or piceous; abdominal terga largely bare, but with some short, whitish pubescence laterally and across base of tergum 1, terga 2-4 with lateral, oblique and rather narrow lines of pale tomentum; tergum 5 quite densely covered with pale yellowish, plumose hairs, following terga and pygidium not exposed.

MALE—Length 6 mm., breadth of abdomen 2.3 mm.; black, including clypeus and labrum, mandibles becoming testaceous apically; antennal flagella brownish beneath, piceous above; tarsi becoming yellow apically, spurs yellowish-hyaline; tegulae and the more basal segments of legs more brownish-piceous; wings hyaline basally, becoming somewhat infuscated at apex, stigma and veins testaceous; cheeks considerably narrower than eyes which are very slightly convergent below; median segments of flagella distinctly longer than broad, basal segment slightly broader than long, only slightly exceeding pedicel; lateral ocelli separated from margin of vertex by much less than their diameter, considerably nearer eyes than to each other; concavity of basal abdominal tergum small, not noticeably carinate; surface of clypeus and of face below ocelli smooth but rather dull, clypeus with a few scattered, very fine punctures, vertex and cheeks more shining, cheeks with minute, scattered and sparse punctures; scutum anteriorly rather dull but smooth, with well separated, quite deep and distinct punctures, posterior third and scutellum shining and impunctate; pleura with scattered, rather coarse punctures which are well separted in general; lateral faces of propodeum rather dull, with quite deep, distinct and rather close punctures, posterior face becoming smooth and shining, dorsal area indefinite, very finely punctate; basal abdominal

tergum somewhat shining and smooth, with scattered, very minute punctures, these becoming somewhat more distinct at each extreme side; basal areas of terga 2-5 finely and quite closely and distinctly punctate, apical impressed areas quite broadly smooth, with only very minute, scattered and sparse punctures evident; apical margin of tergum 7 sharply reflexed beneath, the resulting ventral surface polished and impunctate; posterior two-thirds of scutum and anterior margin of scutellum with erect but rather thin black pubescence; mid and hind tibiae with some black hairs on outer surface toward base; pubescence of head and thorax otherwise entirely pale ochraceous, quite dense around antennae and over lower part of face, more copious and elongate on thorax laterally and beneath, scutellum with a quite dense marginal fringe of elongate pale pubescence; basal tergum pale pubescent basally and laterally, median posterior area with some extremely short, suberect, obscure, black pubescence; basal areas of terga 2-4 with some very short and obscure, suberect, black pubescence, 2 with a pair of slightly oblique, narrow, pale fasciae on each side, widely separated medially, 3-5 with transverse, pale ochraceous fasciae separating the basal and apical areas, 6 rather densely pale pubescent apically.

DISTRIBUTION—Jamaica and Cuba to Florida.

A female of this species, and another of the following species, were collected at Homestead, Florida on April 1, 1939 by J. C. Bradley.

Exomalopsis (Exomalopsis) similis Cresson

Exomalopsis similis Cresson, 1865. Ent. Soc. Phil. Proc. 4, p. 191. ♀.

FEMALE—Length 6 mm., breadth of abdomen 2.8 mm.; black, antennae more piceous; mandibles becoming testaceous apically; tarsal segments 2-5 testaceous; spurs yellowish; tegulae dark posteriorly, becoming pale yellowish anteriorly; wings subhyaline, faintly clouded apically, stigma brownish, veins testaceous to piceous; cheeks much narrower than eyes; clypeus quite flat; labrum broadly rounded, median length about one-third the breadth; mandibles simple; median segments of flagellum about as broad as long, basal segment slightly longer; lateral ocelli considerably nearer eyes than to each other; hind basitibial plate large, slightly longer than basal width, subtriangular, apex narrowly rounded; clypeus and labrum somewhat shining, with rather coarse, sparse punctures; cheeks, vertex and face above antennae more shining, with fine and rather close punctures on cheeks and across face, but these fading out toward the impunctate vertex; dorsum of thorax shining, punctures quite close and coarse across anterior half of scutum, becoming sparse over posterior half, but hind margin and scutellum with very minute and close punctures; pleura closely punctate and dull anteriorly, becoming somewhat shining posteriorly, punctures more minute and sparse; propodeum closely, finely and quite uniformly punctate; basal abdominal tergum with a restricted area on each extreme side that is closely and finely punctate, the broad median area shining and impunctate, with a distinct basal carina separating the dorsal and anterior surfaces; tergum 2 finely and closely punctate laterally and across base, the punctures more minute and sparse medially and apically; following terga covered by preceding plates or by dense tomentum; punctures of basal sterna sparse and minute, becoming quite close on the more apical sterna; pubescence pale in general, quite copious between eyes and antennae, across face above antennae, on cheeks, and a fringe behind vertex; pubescence pale ochraceous and quite copious on pleura, somewhat shorter on scutum, pale anteriorly, but disc with very short, thin and obscure dark pubescence; scutellum with a dense and erect ochraceous fringe, propodeum with short and rather thin, whitish hairs; legs chiefly pale pubescent, whitish basally, more or less yellowish on tarsi, mid tibiae with a patch of fuscous hairs, scopa on hind legs yellow, with a fringe of fuscous hairs just below basitibial plate; basal tergum narrowly pale pubescent on each side and across base, otherwise bare; tergum 2 with a pair of oblique tomentose fasciae laterally which are widely separated medially, apical margin entirely bare; exposed apical areas of following terga densely ochraceous tomentose, apical margins of 3 and 4 narrowly exposed.

MALE—Length 5.5 mm., breadth of abdomen 2 mm.; black, including clypeus and labrum, mandibles becoming brownish-testaceous apically, antennal flagella testaceous beneath, brownish-piceous above; tegulae yellowish-hyaline, legs basally brownish-piceous, becoming more yellowish apically, tarsi and spurs pale yellow; wings clear hyaline, stigma and veins pale testaceous; cheeks much narrower than eyes; eyes slightly convergent below; median segments of flagella slightly longer than broad, basal segment with length and breadth about equal, slightly shorter than pedical; lateral ocelli much nearer eyes than to each other, separated from margin of vertex by less than their diameter; concavity of basal abdominal tergum very small, not noticeably carinate; clypeus and lower part of face quite smooth, somewhat shining, clypeus with a few, very mi-

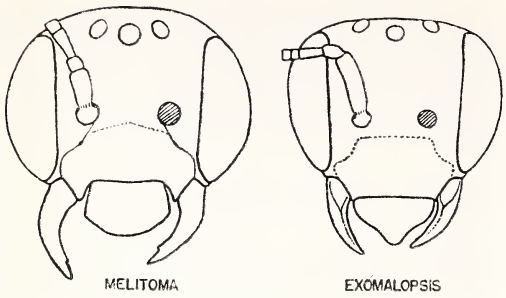


Figure 69
Facial view of head in females of *Exomalopsis* and *Melitoma*.

nute punctures, upper part of face shining, with scattered, exceedingly minute and obscure punctures; vertex and cheeks shining, with barely distinguishable, scattered punctures; scutum and scutellum somewhat shining, punctures quite deep and distinct, rather fine, well separated but not sparse over anterior two-thirds, becoming rather sparse posteriorly, those on scutellum somewhat finer and quite close; punctures of pleura rather coarse but shallow, well separated but not sparse, propodeum laterally smooth and shining, with punctures rather coarse and close posteriorly, becoming fine and sparse anteriorly, posterior face smooth and shining medially, dorsal area rather indefinite, with quite close, fine punctures; basal abdominal tergum well covered with fine but quite deep and distinct, slightly separated punctures, these becoming somewhat closer at each extreme side; terga 2-6 quite closely, deeply and finely punctate basally, the broadly impressed apical margins yellowish-hyaline, with only exceedingly minute and obscure punctures evident; apical margin of tergum 7 reflexed, the resulting ventral surface smooth and shining; pubescence of head and thorax quite short, entirely pale, somewhat more copious on face below and around antennae, on thorax laterally and across posterior margin of scutellum; pubescence of legs entirely yellowish-white; abdominal terga with no evident dark pubescence, the basal tergum with rather short, dense pubescence across base and at each extreme side, 2-5 with rather vague, transverse fasciae of whitish pubescence separating the basal and apical areas, but overlying much of the apical area of each tergum; tergum 6 with some pale, more apical pubescence.

DISTRIBUTION—Costa Rica to Cuba and Florida.

Ptilothrix Smith

(Fig. 67)

Ptilothrix Smith, 1853. Cat. Hym. Brit. Mus. 1, p. 131. Type: *Ptilothrix plumatus* Smith. By monotypy.

Ptilothrix Marschall, 1873. Nomendator Zoologicus, p. 269. Emend.

Emphor Patton, 1879. U. S. Geol. Geog. Surv. Bul. 5, p. 476. Type: *Melissodes bombiformis* Cresson. Monob. and orig. desig.

Energoponus Holmberg, 1903. Mus. Nac. Buenos Aires An. (3) 2, p. 406. Type: *(Energoponus strenuus* Holmberg) = *Ptilothrix plumatus* Smith. Desig. by Sandhouse, 1943.

In *Ptilothrix* the vertex is broadly convex (as in *Melitoma*, fig. 69), the clypeus is black in both sexes, and in the front wing the marginal cell is acute apically, slightly bent away from the coastal margin. There are three submarginal cells, the 2nd shorter than the 1st or the 3rd. The basal segment of the flagellum is shorter than the scape, and barely equal to segments 2 and 3 combined, in both sexes. The arolia are absent. In the female, the scopa on the hind tibiae and basitarsi is of finely plumose, elongate hairs.

Ptilothrix bombiformis (Cresson)

Melissodes bombiformis Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30, p. 219. ♀ ♂.

Emphor bombiformis Patton, 1879. U. S. Geol. Geog. Surv. Bul. 5, p. 476.

Emphor bombiformis Robertson, 1890. Canad. Ent. 22, p. 217. (biology)

Emphor bombiformis Knab, 1911. Ent. Soc. Wash. Proc. 13, p. 170. (biology)

Emphor bombiformis Grossbeck, 1911. N. Y. Ent. Soc. Jour. 19, p. 238. (biology)

Emphor fuscojubatus Cockerell, 1913. Psyche 20, p. 107. ♀. New synonymy

Emphor fuscojubatus Nichols, 1913. Psyche 20, p. 107. (biology)

Emphor bombiformis Robertson, 1914. Ent. News 25, p. 70. (biology)

Emphor bombiformis Robertson, 1918. Canad. Ent. 50, p. 320. (biology)

Emphor bombiformis Robertson, 1925. Psyche 32, p. 278. (biology)

Emphor bombiformis Davis, 1926. Brooklyn Ent. Soc. Bul. 21, p. 127. (biology)

Emphor bombiformis Robertson, 1929. Flowers and insects. Lancaster, Pa., Science Press. (flower records)

Emphor bombiformis Rau, 1930. Brooklyn Ent. Soc. Bul. 25, p. 28. (biology)

Emphor bombiformis Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 222. (biology)

Emphor bombiformis Michener, 1947. Amer. Midland Nat. 38, p. 451. (biology)

Ptilothrix bombiformis Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1075. (larva)

FEMALE—Length 13-17.5 mm., breadth of abdomen 5-7 mm.; black, including mandibles, antennae and legs, spurs brownish-testaceous, tegulae yellowish-hyaline; wings uniformly, rather lightly infuscated, veins brownish to piceous; cheeks somewhat narrower than eyes; clypeus somewhat protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles with a small, inner, subapical angle, apical half largely testaceous on outer surface in some specimens; basal segment of flagellum slightly longer than segments 2 and 3 combined, these no longer than broad; punctures of clypeus quite coarse and deep, rather sparse medially, becoming somewhat finer and closer at each extreme side; median length of labrum about half the breadth, rather broadly rounded apically, margin much thickened, surface shining between rather fine, deep, slightly separated punctures, these becoming crowded laterally and apically; lateral areas of face below antennae shining, very minutely punctate, punctures somewhat separated, median area much more coarsely and closely punctate, upper part of face below level of ocelli shining, punctures quite coarse, deep, well separated but hardly sparse on each side, becoming somewhat closer medially below anterior ocellus; surface between lateral ocelli and eyes shining and impunctate; vertex rather closely punctate posterior to ocelli, the punctures becoming finer and more sparse on the shining cheeks posteriorly; punctures of scutum fine but deep and distinct, quite uniformly close throughout; pleura somewhat shining between coarser, deeper, slightly separated punctures, these becoming closer above; posterior face of propodeum shining, punctures fine and quite sparse, dorsal area with minute and quite uniformly close punctures, lateral faces finely and rather deeply punctate, the punctures quite close anteriorly, rather sparse and minute posteriorly and below; discs of abdominal terga very minutely and closely punctate throughout, only the very narrow, apical rims impunctate; pygidium elongate triangular, apex rather narrowly rounded; pubescence rather short and erect on head and thorax, pale yellowish above antennae and along margin of eyes, clypeus largely bare, labrum with a quite dense, yellowish, apical fringe, vertex with more elongate pale ochraceous pubescence, and cheeks with rather elongate hairs below; entire thorax quite densely covered with pale ochraceous pubescence, obscuring the surface in large part; legs largely black pubescent, but front femora with a posterior fringe of elongate, pale ochraceous hairs; hind tibial scopa black, the hairs short plumose; basal abdominal tergum with some very obscure, rather short, pale pubescence anteriorly, disc otherwise covered with short, suberect, fuscous or blackish pubescence; remaining terga quite densely covered with very short, erect, entirely black pubescence, that on the more apical terga becoming somewhat elongate laterally.

MALE—Length 12.5-17.5 mm., breadth of abdomen 5-6.5 mm.; black, the mandibles more or less yellowish-testaceous apically, spurs brownish-testaceous, tegulae testaceous-hyaline; wings rather uniformly infuscated, veins brownish to blackish; cheeks subequal to eyes in width; clypeus only slightly protuberant, its median length somewhat less than half the distance between eyes; eyes subparallel; outer margin of mandibles somewhat angulated at base, without distinct inner teeth; median length of labrum slightly more than half the width, broadly rounded apically, margin slightly thickened; basal segment of flagellum as long as segments 2 and 3 combined; clypeus and labrum somewhat shining, quite finely and closely punctate; lateral areas of face below level of antennae very minutely and quite closely punctate, surface above rather uniformly, finely punctate, punctures slightly separated below ocelli, becoming minute and sparse above, space between ocelli and eyes shining and nearly impunctate, vertex minutely and rather closely punctate; cheeks shining, with minute, rather widely separated punctures; scutum and scutellum somewhat shining beneath dense pubescence, punctures very fine and rather close, punctures of pleura quite deep and distinct but very fine and close throughout; posterior face of propodeum below somewhat shining, punctures minute, rather widely separated, dorsal area somewhat less shining, punctures closer, becoming very close at extreme sides, lateral surfaces shining, punctures fine but rather deep and distinct, well separated but hardly sparse; abdominal terga quite uniformly, closely and very minutely punctate throughout, the apical, impressed areas obscurely yellowish-hyaline beneath dark pubescence; pubescence short but rather dense over most of face, entirely pale ochraceous; quite dense between antennae and posterior to ocelli, somewhat thinner across vertex and on cheeks anteriorly; thorax uniformly, densely covered with short, pale ochraceous pubescence; coxae and trochanters largely pale pubescent, but legs otherwise with short blackish pubescence; basal abdominal tergum with very short, dense, pale ochraceous pubescence anteriorly, this becoming brownish dorsally, darker toward apical margin, the following terga densely covered with very short, erect, black pubescence; sterna 7 and 8 and genital armature as shown (fig. 70).

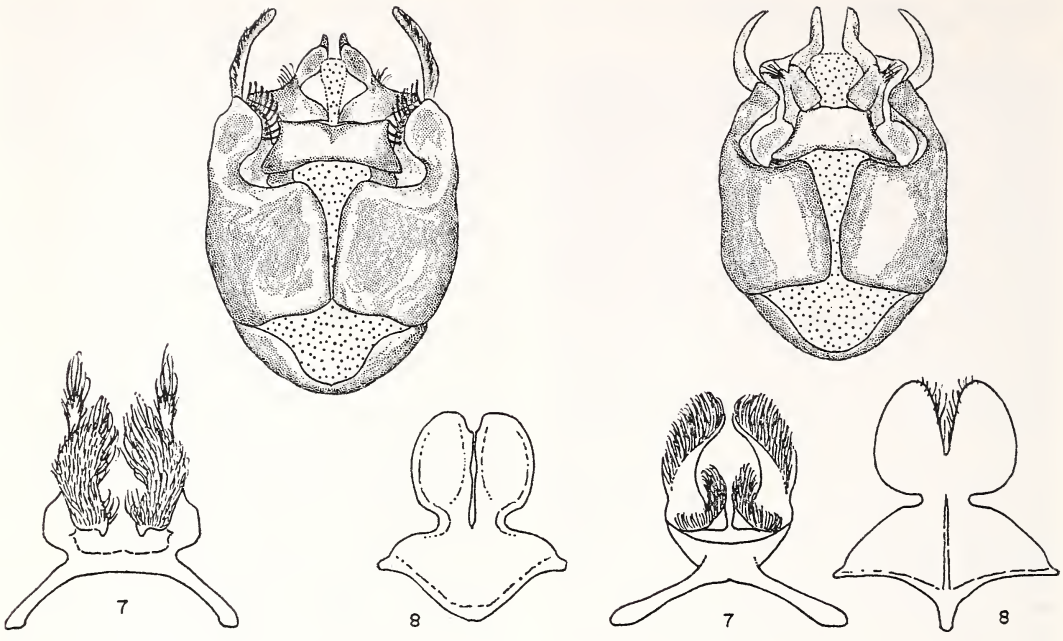


Figure 70—Genital armature and sterna 7 and 8 in males of *Melitoma taurea* and *Ptilothrix bombiformis*.

DISTRIBUTION—Kansas to New Jersey, south to Texas and Florida, June to August.

FLOWER RECORDS—*Hibiscus*. Robertson (1929) records this species on *Cephalanthus, Cirsium, Ipomoea, Verbena* and *Vernonia*.

Cockerell (1913) separated *fuscojubatus* from *bombiformis* on very unreliable characters, chiefly on color of pubescence on face and vertex. This tends to be somewhat paler in specimens from the more southern states, darker in specimens from the middle Atlantic states, but is not entirely constant, and all degrees of intergradation can be found. It seems hardly justified, therefore, to recognize *fuscojubatus* even as a subspecies.

Melitoma Lepeletier and Serville

(Figs. 67 & 69)

Melitoma Lepeletier and Serville, 1828. Encycl. Meth. Hist. Nat. Ins. 10, p. 529. Type: *Melitoma euglossoides* Lepeletier and Serville. Monob.

Entechnia Patton, 1879. U. S. Geol. and Geog. Surv. Bul. 5, p. 476. Type: *Anthophora taurea* Say. Monob. and orig. desig.

Meliphila Schrottky, 1902. Buenos Aires Mus. Nac. de Hist. Nat. An. 7, p. 310. Type: *(Meliphila ipomoeae* Schrottky) = *Melitoma euglossoides* Lepeletier and Serville. Monob. and orig. desig.

Melitoma resembles *Ptilothrix* in wing venation, in the entirely black clypeus of both sexes, and in the broadly convex vertex (fig. 69). The basal segment of the flagellum is nearly equal to the scape and to segments 2-4 combined in both sexes. It differs from *Ptilothrix* in having distinct arolia between the claws. The scopal hairs on the hind tibiae and basitarsi of the female are rather elongate and very finely plumose.

Melitoma taurea (Say)

(Fig. 70)

Anthophora taurea Say, 1837. Boston Jour. Nat. Hist. 1, p. 410. ♂ ♀.

Anthophora taurea Walsh, 1868. Amer. Ent. 1, p. 10. (biology)

Entechnia (Anthophora) taurea Ashmead, 1894. Psyche 7, p. 25.

Podalirius taureus Dalla Torre, 1896. Cat. Hym. 10, p. 291.

Entechnia taurea Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 175. (biology)
Entechnia taurea Rau, 1929. Psyche 36, p. 155. Hym. 10, p. 291.
Melitoma taurea Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Entechnia taurea Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 222. (biology)

FEMALE—Length 10-12.5 mm., breadth of abdomen 4-5.5 mm.; entirely black, including antennae, legs, spurs and tegulae, only the mandibles with an obscure, subapical, testaceous infusion; wings whitish-hyaline, veins testaceous to blackish; cheeks slightly narrower than eyes; clypeus rather strong protuberant, its median length slightly less than half the distance between eyes (fig. 69); eyes subparallel; mandibles with an obscure, inner subapical angle; breadth of labrum considerably greater than median length, apical margin somewhat thickened, very slightly outcurved; basal segment of flagellum slightly longer than segments 2-4 combined; punctures of clypeus coarse and deep, slightly separated above, becoming quite close apically and laterally, those of labrum deep, distinct and uniformly close; lateral surface of face below antennae shining, very minutely punctate, the more median punctures above deep and distinct, rather fine and close, becoming minute and well separated toward margin of eye, surface between eyes and lateral ocelli polished and largely impunctate; cheeks shining, with rather fine, well separated but distinct punctures beneath the rather sparse pubescence; scutum somewhat shining between coarse, deep and close punctures, these becoming somewhat more shallow and close along anterior margin; scutellum with much finer, very close punctures throughout; pleura somewhat shining, punctures quite coarse and deep, slightly separated, becoming rather fine and close anteriorly; posterior face of propodeum rather dull, punctures very fine, indistinct, slightly separated, dorsal area impunctate but dull and finely tessellate, lateral faces somewhat shining, finely and indistinctly punctate below; discs of abdominal terga with very fine and close punctures, apical margin of basal tergum rather broadly impunctate, the shallowly impressed apical area of tergum 2 much more minutely but closely and fully punctate, terga 3-5 not noticeably impressed apically; pygidium small, very narrow, elongate, apex very narrowly rounded; pubescence of head and thorax rather short but quite copious, whitish on face and cheeks, with some erect, elongate, fuscous hairs below ocelli and across vertex, but this fringed posteriorly with shorter white hairs; scutum with fine, densely plumose pubescence anteriorly, this extended along mid-line nearly to posterior margin, the lateral margins and posterior border quite densely pale pubescent, with a broad arcuate band of fuscous pubescence separating the areas of light pubescence, originating in close proximity to a tuft of fuscous hairs on tubercles; scutellum largely fuscous pubescent, but with a narrow posterior fringe of pale hairs that are continuous with similar pubescence on propodeum; lateral surfaces of propodeum and pleura in large part fuscous pubescent, anterior faces of pleura pale pubescent, and a smaller tuft of whitish pubescence posteriorly; legs largely black pubescent, but front femora with a posterior fringe of whitish hairs, some pale hairs on outer surface of the front tibiae; mid tibiae and basitarsi with some pale pubescence on outer face; hind tibial scopa entirely black, hairs very finely plumose; basal abdominal tergum with some short, greyish pubescence basally, this broadened on each side to occupy the entire lateral margin; terga 2-4 with very narrow, dense, white, apical fasciae, discs otherwise covered with very short, inconspicuous but rather dense black pubescence; terga 5 and 6 entirely black pubescent, hairs somewhat more elongate.

MALE—Length 9.5-12 mm., breadth of abdomen 4-5 mm.; black, antennal flagellum, mandibles and tibial spurs somewhat more piceous, apical tarsal segments becoming brownish, tegulae black; wings whitish-hyaline, veins testaceous to piceous; cheeks somewhat narrower than eyes; clypeus quite strongly protuberant, its median length half the distance between eyes; eyes subparallel; mandibles slender and simple, rather strongly reflexed; breadth of labrum considerably greater than its median length, apical margin thickened, broadly subtruncate medially; punctures of clypeus rather coarse, somewhat finer and closer along mid-line, becoming more distinctly separated on each side, those on labrum rather uniformly deep and close; punctures of face very minute and indistinct laterally, becoming quite deep and somewhat coarser medially, rather coarse between antennae and ocelli, surface between ocelli and eyes smooth and shining, very sparsely punctate; cheeks shining, punctures quite coarse, deep and distinct along posterior margin, becoming minute and indefinite toward margin of eye; punctures of scutum quite coarse and deep, slightly separated medially on posterior half, becoming finer and quite close anteriorly; scutellum shining, punctures uniformly fine and close; pleura somewhat shining between deep and rather coarse punctures, these somewhat separated medially, becoming finer and closer anteriorly; posterior face of propodeum rather smooth and shining medially, dorsal area becoming dull, densely tessellate and impunctate across upper margin, with only a few scatter-

ed, minute punctures on posterior face below, lateral faces somewhat shining between rather fine, deep and distinct, slightly separated punctures; abdominal terga minutely and quite closely punctate throughout, basal tergum rather broadly impunctate across apical margin; broad apical impressed area of tergum 2 somewhat more minutely punctate than basal area; terga 3-6 not noticeably impressed apically, disc of each quite uniformly, finely and closely punctate; pubescence of head and thorax quite copious and dense but rather short, face and cheeks with largely whitish or pale yellowish pubescence, vertex with some erect, fuscous hairs, and a few similar hairs below level of ocelli on each side; scutum with fine, densely plumose pubescence anteriorly, this extended along mid-line nearly to posterior margin, lateral margins and posterior border quite densely pale pubescent, with a broad arcuate band of fuscous pubescence separating the areas of light pubescence, originating in close proximity to a tuft of fuscous hairs on tubercles; scutellum largely fuscous pubescent, but with a narrow posterior fringe of pale hairs that are continuous with similar pubescence on propodeum; pleura and propodeum largely pale pubescent, but propodeum with a tuft of elongate, more fuscous hairs just posterior to wing bases on propodeum; pubescence of front and middle legs largely pale, basitarsi with dark brownish or fuscous pubescence beneath, more brownish on outer face; hind coxae, trochanters and femora largely pale pubescent, tibiae with short, appressed pale hairs on outer face except toward apex but with more elongate and erect fuscous pubescence on inner face, basitarsi largely fuscous or brownish pubescent; terga 2-4 with very narrow, dense, white, apical fasciae, discs otherwise covered with very short, inconspicuous but rather dense, black pubescence; tergum 5 with a narrow, dense, white, apical fascia, the disc black pubescent, and tergum 6 white tomentose apically, the fascia somewhat less definite, discs black pubescent but with some pale hairs across base; sterna 7 and 8 and genital armature as shown (fig(. 70).

DISTRIBUTION — Kansas to Virginia and Florida, March to May in Florida, June to September elsewhere.

FLOWER RECORDS — *Ipomoea.* A few specimens have been collected on *Clitoria* and *Oenothera,* but no pollen-collecting activity was observed. Robertson (1929) includes collections on *Asclepias, Cirsium, Convolvulus* and *Hibiscus.*

Peponapis Robertson

Peponapis Robertson, 1902. Canad. Ent. 34, p. 324. Type: *Macrocera pruinosa* Say. Orig. desig.

This genus is related to *Xenoglossa* and also commonly visits squash blooms. These bees are smaller, but the venation of the front wing is quite similar. The clypeus is slightly separated from the margin of the eye, the resulting space little if any greater than the narrow malar space. In the female the clypeus is black, that of the male black basally, with a more or less extensive yellow maculation apically. The female mandibles are bidentate at apex, and the scopal hairs of the hind tibiae and basitarsi are simple. The basal segment of the flagellum in the female approximates the combined length of segments 2 and 3, but in the male the basal segment is short, about a third the length of segment 2, the following segments about twice as long as broad. Terga 6 and 7 in the male are simple, lacking any lateral angles or spines.

Peponapis pruinosa pruinosa (Say)

(Figs. 71 & 72)

Macrocera pruinosa Say, 1837. Boston Jour. Nat. Hist. 1, p. 405. ♂ ♀.
Macrocera Philadelphica Lepeletier, 1841. Hist. Nat. Ins., Hym. 2, p. 110. ♂.
Xenoglossa pruinosa Patton, 1879. U. S. Geol. and Geog. Surv. Bul. 5, p. 473.
Xenoglossa spriuna Howard, 1901. Insect Book, Pl. VII. fig. 2 (error?).
Peponapis pruinosa Robertson, 1902. Canad. Ent. 34, p. 324.
Xenoglossa pruinosa var. *lutzi* Cockerell, 1923. Canad. Ent. 55, p. 205. ♀ ♂.
Xenoglossa pruinosa Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7), p. 34. (biology)
Peponapis pruinosa Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12.5-14 mm., breadth of abdomen 5-5.5 mm.; black, the mandibles obscurely yellowish toward apex, apical tarsal segments brownish-testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings subhyaline, veins piceous to black; cheeks much narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes (fig. 71); eyes subparallel; mandibles obscurely bidentate at apex; basal segment of flagellum about equal to segments 2 and 3 combined; punctures of clypeus coarse and contiguous, becoming slightly separated along upper margin; labrum quite

coarsely and closely punctate throughout, apical margin subtruncate, very shallowly emarginate medially; supraclypeal area rather sparsely punctate medially, lateral surfaces of face below level of antennae quite deeply, closely and rather finely punctate, surface above antennae somewhat more shining, punctures more minute but rather close, a limited area below anterior ocellus polished and impunctate; cheeks very finely and closely punctate beneath the rather dense pubescence; scutum somewhat shining medially, punctures rather coarse, well separated but not sparse, the peripheral punctures somewhat finer and considerably closer; scutellum very finely and closely punctate; pleura dull, punctures shallow and rather vague, somewhat separated in general; posterior face of propodeum polished and largely impunctate, dorsal area becoming rather coarsely reticulate along upper margin, lateral faces finely and closely punctate beneath dense pubescence; basal abdominal tergum with fine punctures across basal half of disc, these becoming very close and more distinct laterally where they nearly reach the apical margin, the median punctures more minute and sparse, apical margin rather broadly impunctate; punctures on discs of terga 2-4 fine and quite close in general, especially at each extreme side, rather well separated medially on 2, but quite uniformly close on 3 and 4, apical impressed areas invaded in part by minute and rather close punctures, the rims narrowly impunctate; pygidium triangular, apex rather narrowly rounded; pubescence of head, thorax and legs entirely pale ochraceous, somewhat more fulvous on dorsum of thorax, quite copious and elongate on head, somewhat shorter but dense on thorax; hind tibial scopa pale ochraceous, the hairs elongate and rather sparsely plumose; basal abdominal tergum with copious, erect and elongate, pale ocraceous pubescence basally and laterally, the rather narrow apical margin bare; tergum 2 pale pruinose across base, this largely hidden by basal tergum, apical impressed area covered in part by pale tomentum, forming a rather broad but indefinite fascia, the apical rim bare; apical half of terga 2 and 3 largely covered with pale tomentum, forming a broad fascia, basal areas of terga very finely and thinly short pubescent, somewhat pruinose on 3 and 4; apical half of tergum 5 densely covered with long, pale fulvous hairs, and 6 fulvous pubescent on each side of pygidium.

MALE—Length 11-13 mm., breadth of abdomen 4-4.5 mm.; black, the median, apical area of clypeus yellow (fig. 71), face otherwise black; labrum somewhat tinged with yellowish medially; mandibles obscurely yellowish toward apex; legs piceous to black basally, tarsal segments more or less brownish-testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings subhyaline, veins testaceous to piceous; cheeks considerably narrower than eyes; clypeus strongly protuberant, its median length slightly greater than half the distance between eyes; eyes subparallel; mandibles obscurely bidentate at apex; basal segment of flagellum rather short, but much longer than pedicel, segment 3 twice as long as basal segment, segment 2 longer than 3; punctures rather coarse, slightly separated on upper half of clypeus, becoming somewhat finer and closer apically, quite obscure on each side; labrum shining, punctures quite deep and distinct but rather fine, slightly separated, median length considerably less than basal width, apical margin quite broadly truncate; supraclypeal area rather dull, sparsely punctate medially, lateral surfaces of face below level of antennae rather dull, punctures quite coarse and close, surface above antennae becoming somewhat more shining, punctures quite close, minute and vague; cheeks minutely punctate along margin of eyes, punctures becoming somewhat more distinct and slightly separated posteriorly beneath the rather long pubescence; scutum somewhat shining medially, the punctures quite coarse and well separated, becoming quite close laterally and anteriorly; scutellum rather dull, punctures quite close and rather coarse; pleura dull, the surface tesellate, punctures shallow, vague and rather sparse; propodeal triangle extensive, polished and impunctate below, becoming rather coarsely, and shallowly reticulate along upper margin, lateral surfaces of propodeum dull, very finely and rather closely punctate; basal abdominal tergum finely and quite sparsely punctate medially, becoming quite closely and deeply punctate laterally nearly to the apical margin, the broad apical median area impunctate; punctures of remaining terga deep and distinct, well separated medially on tergum 2, becoming very fine and almost crowded on the more apical terga, the apical impressed areas invaded in part by minute but rather close punctures, only the rather narrow apical rims impunctate; pubescence of head and thorax copious and erect, entirely pale, rather whitish on face and cheeks below,

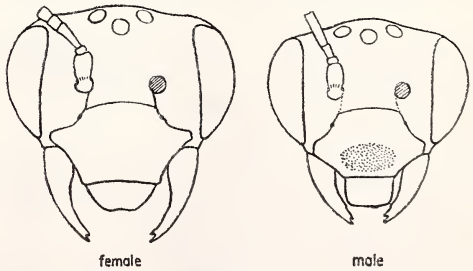


Figure 71
Facial view of head in both sexes of *Peponapis pruinosa.*

pale ochraceous on head dorsally and on thorax laterally, somewhat brighter ochraceous or fulvous on dorsum of thorax; legs entirely pale pubescent; basal segment of abdomen with copious, elongate, pale ochraceous pubescence; tergum 2 rather broadly whitish pruinose across base, and apical impressed area thinly pruinose across base, forming a rather distinct greyish-white fascia, intervening area nearly bare, with only exceedingly short, inconspicuous, dark hairs evident; terga 3-6 rather broadly whitish pruinose across apical impressed area, the rims narrowly exposed, discs basally with dark, suberect, more or less elongate pubescence, a few elongate dark hairs overlying the whitish fasciae; tergum 6 not angulate or spinose laterally; median length of pygidial plate much less than basal width, the margins strongly carinate and strongly converging apically to the rather narrowly subtruncate apex; sterna 7 and 8 and genital armature as shown (fig. 72).

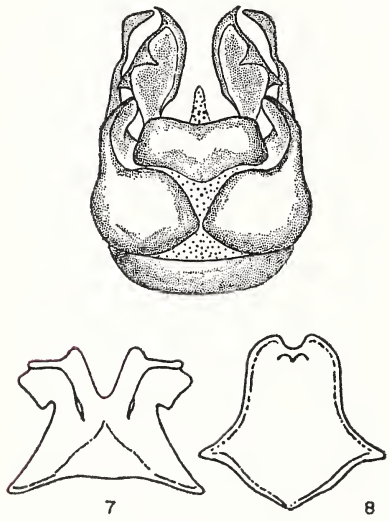


Figure 72
Genital armature and sterna 7 and 8 in male of *Peponapis pruinosa*.

DISTRIBUTION — Utah and Arizona, eastward to the New England states and Georgia, June to September.

FLOWER RECORDS — *Cucurbita* and *Pontederia*. Recorded by Robertson (1929) on *Asclepias, Blephilia, Cephalanthus, Convolvulus, Ipomoea* and *Verbena*.

The subspecific designation of *pruinosa* is made necessary by the recognition of another subspecies in Southern Texas.

Xenoglossa Smith

Xenoglossa Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 315. Type: *Xenoglossa fulva* Smith. Monob.

These are handsome, robust and quite hairy bees. The clypeus is largely yellow in the male, black, at least over the basal half, in the female. In the front wing the marginal cell is elongate, the tip slightly bent away from the costa, and the 2nd submarginal cell is much shorter than the 1st or 3rd. The basal segment of the flagellum is elongate, slightly shorter than segments 2 and 3 combined, in both sexes, the following segments not much longer than broad. The clypeus is somewhat separated from the margin of the eye, the resulting space about equal to the malar space. In the two species that occur east of the Mississippi the mandible in both sexes is to some degree angulate on the inner margin toward the base.

Both of these species are common visitors to squash (*Cucurbita*). They are primarily matinal in their flight, and females can rarely be collected more than an hour or two after sunrise. Males continue activity sometimes until mid-day, but then the closing of the blooms prevents any further visits. These males often become trapped, or remain in the closed blooms for the remainder of the day, and possibly through the night.

KEY TO SPECIES

1. Females 2
   Males 3

2. Apical half of clypeus yellow ..... *kansensis* Cockerell (p. 247)
   Clypeus entirely black or with a narrow and rather faint yellowish mark along apical margin ..... *strenua* Cresson (p. 248)

3. Clypeus with a rather broad band of black across the upper margin medially; abdominal pubescence ochraceous; sub-basal inner angle of mandible robust and acute ..... *strenua* Cresson (p. 248)
   Median area of clypeus along upper margin with very little black; abdominal pubescence greyish; sub-basal inner angle of mandibles low and inconspicuous ..... *kansensis* Cockerell (p. 247)

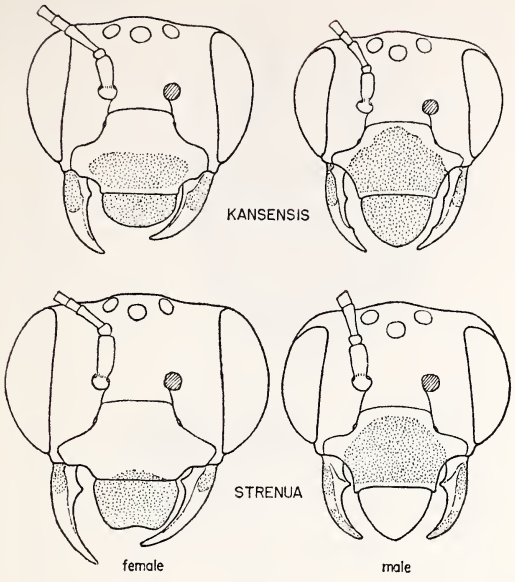


Figure 73
Facial view of head in species of *Xenoglossa*.

Xenoglossa kansensis Cockerell
new combination
(Figs. 73 & 74)

Xenoglossa strenua var. *kansensis* Cockerell, 1905. Psyche 12, p. 104. ♂.

FEMALE—Length 14-16 mm., breadth of abdomen 6 mm.; black, the labrum dull yellowish, mandibles pale yellowish at base, piceous, sometimes with an apical testaceous maculation (fig. 73); apical half of clypeus yellow; legs piceous, mid and hind spurs dull testaceous, tegulae yellowish-hyaline; wings faintly yellowish-brown, veins piceous; cheeks very slightly narrower than eyes; clypeus rather strongly protuberant, its median length half the distance between eyes below; eyes slightly divergent below; mandibles slender and simple apically, with a slight, inner, subbasal angle; basal segment of flagellum very slightly longer than segments 2 and 3 combined; median length of labrum about two-thirds the basal width, apical margin rather broadly truncate; clypeus closely and rather coarsely punctate, becoming more finely and densely so toward apical margin; labrum somewhat more deeply but finely punctate medially, punctures becoming somewhat coarser but still close laterally; supraclypeal area rather dull, with scattered, rather sparse, shallow punctures, those on lateral surfaces of face below level of antennae shallow and rather close, becoming minute and close above antennae; surface between eyes and ocelli shining, nearly impunctate; cheeks finely and closely but quite distinctly punctate; scutum, scutellum and pleura quite closely and finely punctate throughout, propodeum posteriorly very minutely punctate, lateral faces dull, very finely and closely punctate; abdominal terga 1-3 rather dull, punctures quite deep and distinct, rather fine in general, crowded laterally, becoming well separated medially on 1 and 2, uniformly close on 3 and 4; terga 1-4 narrowly impunctate along apical rims; pygidium subtriangular, apex narrowly rounded; pubescence pale ochraceous, quite dense and elongate on head, thorax, legs, and basal abdominal tergum, rather short but very dense on dorsum of thorax, hiding the surface, dense, copious and elongate on each side of propodeum, somewhat paler and thinner over most of face and on pleura below and posterior face of propodeum; basal tergum largely bare over apical half; terga 2 and 3 largely bare, each with a narrow, basal, greyish tomentose area which is largely covered by the preceding tergum, this narrowly contiguous with a submedian greyish fascia on 3 that fringes the apical impressed area at base but is widely interrupted medially; tergum 4 with a nearly complete, submedian greyish fascia; tergum 5 greyish tomentose across base, with a dense apical fimbria of more ochraceous pubescence.

MALE—Length 14-15 mm., breadth of abdomen 5-6 mm.; black, the clypeus bright yellow in large part, apical margin narrowly testaceous and dorsal margin invaded only slightly with black, if at all (fig. 73); labrum yellowish, mandibles broadly yellowish at base, apex more testaceous or orange; legs brownish-ferruginous to piceous, mid and hind spurs rather dull testaceous; tegulae yellowish-hyaline; wings lightly infuscated, veins piceous to black; cheeks subequal to eyes in width; clypeus quite strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly divergent below; mandibles slender and simple apically, the sub-basal inner angle weakly developed; basal segment of flagellum considerably shorter than segments 2 and 3 combined; punctures of clypeus rather coarse and close, those on labrum somewhat finer; supraclypeal area rather dull, punctures obscure, lateral areas below level of antennae dull, punctures shallow and vague but rather close, becoming somewhat finer and closer above antennae, surface shining between eyes and lateral ocelli; cheeks finely and closely punctate beneath rather dense but short pubescenc; scutum, scu-

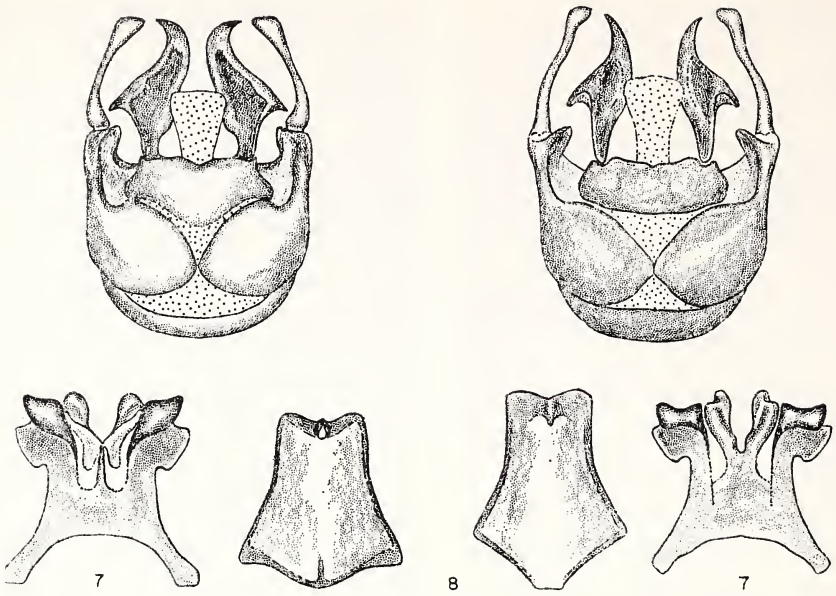


Figure 74—Genital armature and sterna 7 and 8 in males of *Xenoglossa*.

tellum, pleura and propodeum quite dull, punctures rather fine and close, somewhat more minute on posterior face of propodeum; abdominal terga rather dull, punctures well separated medially on 1 and 2, becoming densely crowded at lateral margins, apical impressed areas closely and regularly punctate except for the narrow rims; terga 3-6 finely and closely punctate throughout except for the narrow apical rims, more minutely and densely punctate on the more apical terga; tergum 6 with a robust, sharply acute and slightly curved, posterior spine on each extreme side; pubescence largely pale ochraceous on head and thorax, quite short, dense and somewhat more fulvous on dorsum of thorax, more whitish on face and cheeks below, rather copious and elongate on basal half of basal abdominal tergum; terga 2 and 3 without distinct basal fasciae; apical impressed areas of 3-6 to some degree fringed with greyish tomentum, widely interrupted on 3, discs otherwise largely bare; median length of pygidial plate about equal to basal width, margins subcarinate, converging apically, the apex abruptly flared beneath and broadly rounded; sterna 7 and 8 and genital armature as shown (fig. 74).

DISTRIBUTION—Kansas to North Carolina and Georgia, May to July.

FLOWER RECORDS—*Cucurbita* and *Ipomoea*.

Xenoglossa strenua (Cresson)

(Figs. 73 & 74)

Melissodes strenua Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 213. ♀ ♂.

Xenoglossa cucurbitarum Cockerell, 1896. Canad. Ent. 28, p. 192. ♂ ♀.

Xenoglossa strenua Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 14-18 mm., breadth of abdomen 6-6.5 mm.; black, the labrum yellowish, mandibles pale yellowish at base, more testaceous over apical half; legs brownish-ferruginous, apical tarsal segments somewhat darker, mid and hind spurs dull testaceous; tegulae yellowish-hyaline; wings faintly yellowish-brown, veins piceous; cheeks very slightly narrower than eyes; clypeus rather strongly protuberant, its median length half the distance between eyes below; eyes slightly divergent below; mandibles slender and simple apically, but with an inner, subbasal angle (fig. 73); basal segment of flagellum about equal to segments 2 and 3 combined; median length of labrum about half the basal width, apical margin rather broadly truncate; clypeus closely and rather coarsely punctate, becoming more finely and densely so toward apical margin; labrum somewhat more deeply but finely punctate medially, punctures becoming somewhat coarser but still close laterally; supraclypeal area rather dull, with scattered,

rather sparse, shallow punctures, those on lateral surfaces of face below level of antennae shallow and rather close, becoming minute and close above antennae, the more median punctures being rather coarse and slightly separated; surface between eyes and ocelli shining, nearly impunctate; cheeks finely and closely but quite distinctly punctate; scutum, scutellum and pleura quite closely and finely punctate throughout, propodeum posteriorly very minutely and closely punctate, dorsal triangle somewhat more coarsely so, lateral faces dull, very finely and closely punctate; abdominal terga 1-3 shining, punctures quite deep and distinct, rather fine in general, close laterally, becoming rather sparse medially on 1 and 2, uniformly close on 3 and 4; terga 1-4 narrowly impunctate along apical rims; pygidium rather strongly triangular, apex very narrowly rounded or subacute; pubescence entirely pale ochraceous, quite dense and elongate on head, thorax, legs, and basal abdominal tergum, rather short but very dense on dorsum of thorax, hiding the surface, dense, copious and elongate on each side of propodeum, somewhat paler and thinner over most of face and on pleura below and posterior face of propodeum, basal tergum largely bare over apical half; tergum 2 largely bare medially, with a basal, yellowish tomentose area that is largely covered by the basal tergum, this narrowly contiguous with a submedian yellowish fascia that fringes the apical impressed area at base on each side, widely interrupted medially; impressed area on tergum 3 rather broadly fringed with yellowish tomentum, slightly interrupted medially but much broadened laterally to fill the entire lateral margins; tergum 4 largely covered with pale ochraceous tomentum, only apical rim exposed; tergum 5 largely yellowish tomentose, with a dense apical fimbria of more ochraceous pubescence.

MALE—Length 14-15.5 mm., breadth of abdomen 5.5-6 mm.; black, the clypeus bright yellow in large part, apical margin narrowly testaceous and dorsal margin invaded narrowly with black; labrum yellowish; mandibles broadly yellowish at base, apex more testaceous or orange; legs brownish-ferruginous in large part, mid and hind spurs rather dull testaceous; tegulae yellowish-hyaline; wings subhyaline, veins piceous to black; cheeks subequal to eyes in width; clypeus quite strongly protuberant, its median length somewhat greater than half the distance between eyes below (fig. 73); eyes very slightly divergent below; mandibles slender and simple apically, but with a strong sub-basal inner angle; basal segment of flagellum slightly shorter than segments 2 and 3 combined; punctures of clypeus rather coarse and close, those on labrum somewhat finer, but deeper and more distinct; supraclypeal area rather dull, punctures obscure, lateral areas below level of antennae dull, punctures shallow and vague but rather close, becoming somewhat finer and closer above antennae, surface shining between eyes and lateral ocelli; cheeks rather finely and closely punctate beneath rather dense but short pubescence; scutum, scutellum, pleura and propodeum quite dull, punctures fine and close throughout, somewhat more minute on posterior face of propodeum; punctures of abdominal terga deep and distinct but rather fine, well separated medially on terga 1 and 2, becoming densely crowded at lateral margins, apical impressed areas punctate in part, the narrow rims shining and impunctate; terga 3-6 finely and closely punctate throughout except for the narrow apical rims, more minutely and densely punctate on the more apical terga; tergum 6 with a robust, triangular, posterior spine on each extreme side; pubescence largely pale ochraceous, quite short, dense and somewhat more fulvous on dorsum of thorax, more whitish on face and cheeks below, rather copious and elongate on basal half of basal abdominal tergum; terga 2 and 3 with pale ochraceous, basal fasciae that may be partially covered by the preceding plates, apical impressed areas to some degree fringed with ochraceous tomentum, widely interrupted on 2, more narrowly so on 3, discs otherwise largely bare; terga 4 and 5 with subapical, quite dense, yellowish fasciae, basal areas thinly yellowish pruinose; tergum 6 densely yellowish tomentose apically; median length of pygidial plate slightly greater than basal width, margins subcarinate, slightly converging apically to the abruptly truncate apex; sterna 7 and 8 and genital armature as shown (fig. 74).

DISTRIBUTION—Specimens of *strenua* are at hand from California, Virginia, North Carolina, Georgia and Florida. The type locality is Texas. It is in flight during June, July and August.

FLOWER RECORDS—*Cucurbita*. Robertson (1929) records it also on *Ipomoea* and *Asclepias*. Probably his identification was correct, but there is a possibility that these records should apply to *kansensis*.

Two females of *strenua* were found in a light trap at Clayton, N. C., on July 5, 1956.

Cemolobus Robertson

Cemolobus Robertson, 1902. Canad. Ent. 34, p. 324. Type: *Xenoglossa ipomoeae* Robertson. Monob. and orig. desig.

The undulate, more or less trilobate clypeal margin will distinguish the single species in this genus from any of the other Anthophoridae. The mandibles are angulate on the outer margin toward the base in

the female, while in the male there is a distinct, submedian tooth on the outer surface. The marginal cell is elongate, and the 2nd submarginal is much shorter than either the 1st or the 3rd. The scopal hairs on the hind tibiae and basitarsi are simple or very obscurely short plumose. In the female the basal segment of the flagellum is slightly shorter than the scape, about equal to segments 2 and 3 combined. In the male, segments 1 and 2 are about equally elongate and very slender, the following segments gradually decreasing in length to the apex.

Cemolobus ipomoeae (Robertson)

(Figs. 75 & 76)

Xenoglossa ipomoeae Robertson, 1891. Amer. Ent. Soc. Trans. 18, p. 65. ♂ ♀.

Cemolobus ipomoeae Robertson, 1902. Canad. Ent. 34, p. 324.

Cemolobus ipomoeae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12.5-14.5 mm., breadth of abdomen 5-6.5 mm.,; black, the apical half of mandibles testaceous; legs blackish, apical tarsal segments somewhat more piceous, spurs brownish; tegulae yellowish-hyaline; wings sub-hyaline, veins brownish to piceous; cheeks much narrower than eyes; clypeus quite strongly protuberant, its median length somewhat less than half the distance between eyes below, its apical margin produced medially and laterally, slightly overhanging base of labrum (fig. 75); mandibles with a slight median angle on outer margin slightly basad of mid point; basal segment of flagellum slightly longer than segments 2 and 3 combined; tibial spurs slightly curved at tips; clypeus closely punctate, rather coarsely so above, becoming quite finely and densely so toward apical margin; labrum nearly twice as broad as median length, with a slight median emargination beneath the dense apical pubescence, punctures quite coarse, close and deep; supraclypeal area somewhat shining, punctures rather fine, slightly separated, lateral surfaces of face below level of antennae finely and quite closely punctate, becoming more minutely but still quite closely punctate above on each side, more coarsely so medially; cheeks very finely and rather closely punctate beneath rather copious pubescence; punctures in central area of scutum deep, distinct and rather coarse, quite close but not crowded, becoming finer and densely crowded peripherally; scutellum rather dull, minutely and very densely punctate; pleura rather dull, punctures shallow but rather coarse and close; posterior face of propodeum quite smooth, dorsal area rather shallowly rugoso-punctate on each side, lateral faces shallowly and rather closely punctate, becoming minutely and densely so anteriorly and below; abdominal terga dull, punctures rather shallow but very close throughout, only the extremely narrow rims impunctate; pygidium subtriangular, apex narrowly rounded; pubescence of head and thorax copious, rather elongate, somewhat whitish on face and cheeks below, more yellowish above, pale ochraceous to whitish on thorax below, becoming fulvous above; legs pale pubescent basally, but tibiae and tarsi more or less fuscous or blackish pubescent, hind tibial scopa fuscous; basal abdominal tergum with some rather copious but rather short pale pubescence across base and the narrow lateral margins, surface otherwise nearly bare; tergum 2 with a pale pruinose band across base, which broadens out to completely cover the lateral margins, disc otherwise largely bare; discs of terga 3 and 4 largely covered with pale, appressed, whitish or greyish tomentum, with a few more elongate, erect hairs toward lateral margins; tergum 5 similarly pale pruinose across base, apical half densely covered with elongate brownish hairs, forming a quite dense fimbria; tergum 6 with dense, brownish or fuscous pubescence on each side of pygidium.

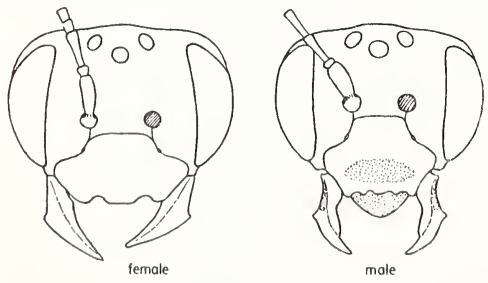


Figure 75
Facial view of head in both sexes of *Cemolobus ipomoeae.*

MALE—Length 13-14.5 mm., breadth of abdomen 5-5.5 mm.; black, the apical half of clypeus pale yellow, but margin fuscous and basal half blackish; labrum largely pale yellow, only the extreme lateral margins dark; mandibles yellow basally, apex more narrowly testaceous; antennal flagella brownish-testaceous beneath, piceous above; legs largely blackish or piceous, spurs brownish-testaceous, with tips slightly curved; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to piceous; cheeks slightly narrower than eyes; clypeus quite strongly protuberant, its median length slightly less than half the distance between eyes, apical margin produced medially and laterally, overhanging the margin of lab-

rum (fig. 75); eyes subparallel; mandibles with a conspicuous median angle on outer margin, with a rounded subapical elevation on inner margin, the apex slightly incised; segments 1 and 2 of flagellum subequal in length; clypeus somewhat shining, the punctures rather coarse, slightly separated medially, quite close on each side, labrum broadly rounded apically, punctures quite close and rather coarse, its median length somewhat more than half the breadth; facial punctures quite close and deep below antennae, becoming more minute but very close above on each side, somewhat coarser medially; cheeks with fine and close punctures throughout, somewhat coarser toward posterior margin; scutum with a median area of distinctly separated punctures, otherwise very densely and finely punctate throughout; scutellum narrowly shining medially, with very fine, and slightly separated punctures, but otherwise densely and minutely punctuate and dull; pleura rather dull, punctures somewhat coarser but close and rather vague; posterior face of propodeum smooth but rather dull, dorsal area becoming rather shallowly rugoso-punctate on each side, lateral areas dull, finely and rather closely punctate; abdominal terga closely punctate throughout, the more basal punctures on the basal tergum somewhat more obscure and definitely separated, punctures rather coarse on tergum 2, but becoming progressively finer on the more apical terga, only the very narrow rims impunctate; pubescence copious and rather elongate on head and thorax, pale, ochraceous to whitish on face and cheeks below, more yellowish above and on thorax laterally, becoming densely fulvous above; legs with largely pale pubescence, somewhat more brownish on basitarsi beneath; basal abdominal tergum rather densely pale ochraceous pubescent across base and on lateral margins, otherwise with only extremely short, barely evident pubescence; tergum 2 pale pruinose across base, this broadened laterally to occupy the entire surface, median area largely bare; terga 3-6 rather thinly covered with whitish, appressed tomentum that is rather thin, with no erect hairs in evidence; median length of pygidial plate about equal to the basal width, margins carinate, rather strongly converging apically, apex rather broadly rounded or subtruncate; sterna 7 and 8 and genital armature as shown (fig. 76).

DISTRIBUTION—Illinois to North Carolina and Georgia, June and July.

FLOWER RECORD—*Ipomoea*.

Females of this attractive bee are matinal in their flight, confining their activities to the first hour or two of daylight. Males, however, may be observed until mid afternoon.

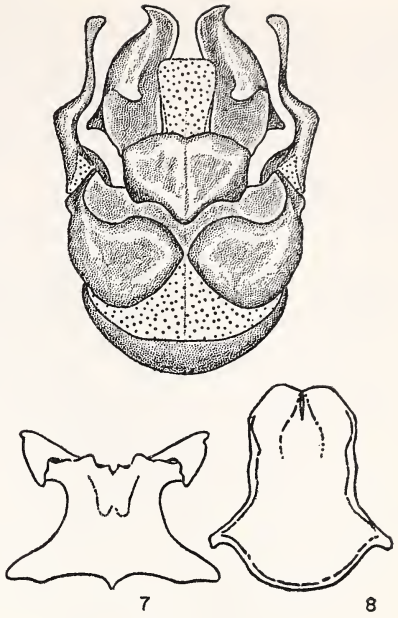


Figure 76
Genital armature and sterna 7 and 8 in male of *Cemolobus ipomoeae*.

Anthedonia Michener

Anthedon Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 53. Preocc. Type: *Melissodes compta* Cresson. Monob.

Anthedonia Michener, 1942. N. Y. Ent. Soc. Jour. 50, p. 282. new name

Abda Sandhouse, 1943. U. S. Nat. Mus. Proc. 92, p. 521. new name unnecessarily proposed.

Bees in this genus are large, hairy and handsome. The clypeus laterally is contiguous with the margin of the eye, and the more or less conspicuous abdominal fasciae are submedian in position. The clypeus is black in the female, yellow in the male. The basal segment of the flagellum is elongate, about equal to segments 2 and 3 in the female, while in the male segment 2 is fully equal to 1, the following segments successively shorter toward the tip, but the apical segment very slender and elongate. The scopal hairs on the hind tibiae and basitarsi are entirely simple but quite copious. The maxillary palpi are 4-segmented.

Anthedonia compta (Cresson)

(Fig. 77)

Melissodes compta Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 199. ♀ ♂.

Anthedon compta Robertson, 1914. Ent. News 25, p. 72. (biology)

Anthedon compta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Anthedonia compta LaBerge, 1955. Kans. Ent. Soc. Jour. 28, p. 132. ♂ ♀.

FEMALE—Length 18 mm., breadth of abdomen 6.5 mm.; black, the apical half of mandibles obscurely testaceous, antennal flagellum piceous beneath, legs piceous, becoming somewhat more brownish apically, mid and hind spurs pale testaeous; tegulae yellowish-hyaline; wings subhyaline basally, becoming faintly infuscated apically, veins testaceous to piceous; cheeks somewhat narrower than eyes; clypeus quite flat, its median length somewhat greater than half the distance between eyes; eyes subparallel; mandibles simple; median length of labrum about half its breadth, rather broadly rounded apically; length of basal segment of flagellum equal to segments 2 and 3 combined; clypeus coarsely and closely punctate above, punctures becoming very fine and densely crowded toward apical margin, those on labrum rather fine and close but quite distinct; punctures of supraclypeal area finer and rather sparse, lateral surfaces below level of antennae very finely, closely and distinctly punctate, punctures above antennae becoming more minute, shallow and obscure laterally, quite distinct medially, surface between ocelli and eyes largely impunctate and somewhat shining; cheeks finely and closely punctate, punctures becoming somewhat more distinct posteriorly; punctures of scutum and scutellum fine and close in general, somewhat more distinctly separated along mid-line, surface shining; pleura somewhat shining between deep, slightly separated punctures; posterior face of propodeum rather dull, punctures rather coarse and close, dorsal area quite fully and closely punctate, surface becoming more rugose along upper margin, lateral faces rather dull, very closely and rather finely punctate; disc of basal abdominal tergum quite closely, finely and distinctly punctate, punctures becoming somewhat closer and finer laterally, apical third of disc impunctate; following terga quite fully and uniformly punctate, punctures fine and close, becoming crowded laterally and on the more apical terga medially, the apical impressed areas quite fully punctate, punctures more minute, rims very narrowly impunctate; pygidium rather broadly triangular, apex narrowly rounded; pubescence quite copious but rather short on head and thorax, pale ochraceous to almost whitish on head, bright ochraceous on thorax dorsally, becoming more whitish below; legs entirely pale pubescent, the hind tibial scopa pale ochraceous, hairs slender and simple; basal abdominal tergum rather copiously pale pubescent across base, and rather narrowly so on lateral margins, disc apically with some very short, obscure, dark pubescence; remaining terga largely covered with short, black pubescence, that on apical impressed areas appressed and very obscure; tergum 2 with a narrow, basal, white fascia, 2 and 3 with narrow, submedian, white fasciae, and 4 with a broader fascia which reaches apical rim toward each side; terga 5 and 6 entirely blackish or fuscous pubescent.

MALE—Length 13-16 mm., breadth of abdomen 5.5-6 mm.; black, the clypeus and labrum entirely pale yellow, mandibles broadly yellow at base; legs piceous to black, apical tarsal segments becoming brownish-testaceous, spurs pale testaceous, tegulae yellowish-hyaline; wings lightly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus slightly protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles slender and simple; segments 1 and 2 of flagellum about equal in length, the apical segment attenuate apically; punctures of clypeus rather fine, somewhat separated but not sparse, becoming closer along apical margin, punctures rather vague on the yellow surface; median length of labrum somewhat less than half the breadth, margin broadly rounded, punctures fine and close but distinct; supraclypeal area somewhat shining and sparsely punctate, lateral surfaces below level of antennae very finely, closely and distinctly punctate, punctures becoming more minute above, area between eyes and ocelli shining, punctures exceedingly minute and close; cheeks finely and quite closely punctate beneath dense pubescence; scutum and scutellum shining, puntures quite deep and rather coarse, close in general, slightly separated in center of scutum posteriorly; pleura somewhat shining, punctures fine and quite close throughout; posterior face of propodeum shining, punctures rather fine but deep, distinct and quite close, dorsal area quite fully punctate, the punctures becoming densely crowded across upper margin, lateral faces very closely punctate throughout; abdominal terga quite fully punctate, only the very narrow apical rims impunctate, punctures of apical impressed areas somewhat more minute than those on basal areas; punctures relatively coarser and slightly separated on terga 1 and 2, becoming progressively finer and closer on the more apical terga; pubescence of head and thorax entirely pale, quite copious and dense but not very long, entirely pale ochraceous on head, becoming somewhat whitish on face and cheeks below, brighter ochraceous on dorsum of thorax, pale ochraceous below and posteriorly, legs

entirely pale pubescent; pubescence copious, elongate and entirely pale ochraceous on basal abdominal tergum, with only a few obscure dark hairs toward apex on each side; tergum 2 with a narrow, basal, white fascia and a submedian fascia fringing the apical impressed area, these separated by an area of short, dense, black pubescence, and apical impressed area with very short subappressed black pubescence; terga 3 and 4 black pubescent basally, with a rather broad, submedian white fascia, the apical impressed area thinly black pubescent, with some scattered, erect, long black hairs toward the base of each; terga 5 and 6 largely black pubescent, the hairs long and erect toward base; tergum 5 with a very small amount of appressed, whitish pubescence at each extreme side; tergum 6 with a quite conspicuous, apical, spine-like angle on each extreme side; tergum 7 not angulate, the median length of pygidial plate about equal to basal width, margins carinate, rather strongly convergent apically to the rather broadly subtruncate apex; sterna 7 and 8 and genital armature as shown (fig. 77).

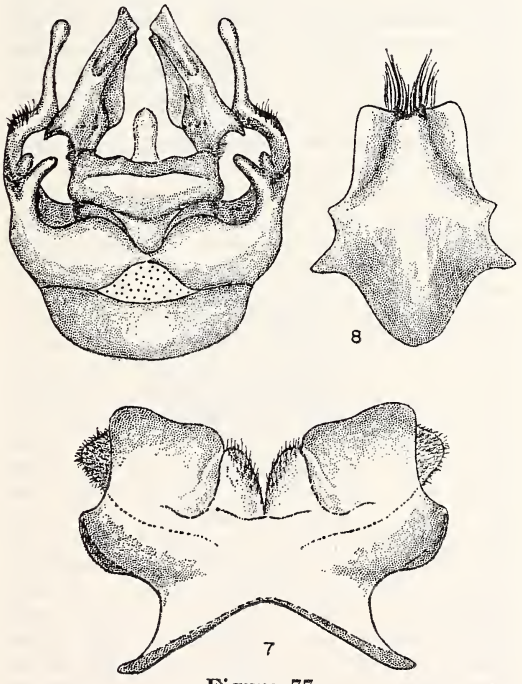


Figure 77
Genital armature and sterna 7 and 8 in male of *Anthedonia compta*.

DISTRIBUTION—Colorado and Texas to New Jersey and Georgia, July and August.

FLOWER RECORDS—Recorded by Robertson (1929) on *Acerates, Monarda, Oenothera, Pycnanthemum* and *Verbena*.

Females of this species visit *Oenothera biennis* primarily and are strictly matinal in their flight. Males are active through a longer period of each day and will visit various other plants.

Florilegus Robertson

Florilegus Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 53. Type: *Melissodes condigna* Cresson. Monob.

Florilegus closely resembles *Melissodes* and may be mistaken for it. The mandibles, however, have a subapical inner angle or tooth in both sexes, and the maxillary palpi are 5-segmented. The clypeus is black and slightly separated from the margin of the eye in the female, while in the male it is yellow and practically contiguous with the eye margin. The scopa is finely plumose. Sternum 7 in the male is distinctive, having a median longitudinal ridge, the apex produced somewhat beyond the margin of the plate. Tergum 6 is distinctly angulate on each side at the base, and tergum 7 is spinose laterally, the pygidial plate entire, the lateral margins not notched.

Florilegus condignus (Cresson)

(Fig. 78)

Melissodes condigna Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 207. ♀.

Melissodes palustris Robertson, 1892. Amer. Nat. 26, p. 273. ♂.

Florilegus condignus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11-12 mm., breadth of abdomen 4-5 mm.; black, mandibles with an obscure, median, testaceous maculation; median segments of flagella brownish beneath, black above; legs blackish, apical tarsal segments becoming brownish-testaceous, mid and hind spurs pale testaceous; tegulae brownish-hyaline; wings uniformly but very lightly infuscated, veins testaceous to piceous; rims of abdominal terga very narrowly yellowish-hyaline; cheeks much narrower than eyes; clypeus slightly protuberant, its median length half the distance between eyes below; eyes very slightly convergent below; mandibles simple, rather short; basal segment of flagellum slightly longer than segments 2 and 3 combined; punctures of clypeus coarse, deep and slightly separated along upper margin, becoming rather fine and densely crowded apically; median length of labrum considerably less than breadth, apical margin broadly truncate, surface finely and closely punctate; supraclypeal

area somewhat shining between rather coarse and close punctures; lateral areas of face below level of antennae minutely and closely punctate, surface above more shining, the punctures somewhat deeper, more distinct and definitely separated, the more median punctures rather coarse; cheeks rather dull, very finely and closely punctate beneath the quite dense pubescence; scutum shining, punctures quite coarse and deep, rather sparse medially toward posterior margin, becoming rather close and somewhat finer laterally, somewhat separated medially to the anterior margin; scutellum shining, punctures very fine and rather widely separated; pleura rather dull, punctures coarse, deep and quite close; posterior face of propodeum somewhat shining, punctures quite deep and distinct, irregularly scattered, dorsal area polished and impunctate below, becoming rather coarsely rugoso-punctate along upper margin, lateral faces dull, very finely and densely punctate; abdominal terga well punctured nearly to the rims, only the very narrow apical margins impunctate, punctures well separated in general, becoming somewhat closer toward lateral margins, apical impressed areas somewhat more minutely punctate than basal areas, those on terga 4 and 5 densely crowded at least laterally; pygidium subtriangular, apex rather narrowly rounded; pubescence rather copious on head and thorax, whitish on face and cheeks, with some elongate fuscous hairs across vertex, but this fringed posteriorly with whitish hairs; scutum and scutellum largely blackish pubescent, but with some pale hairs along anterior and lateral margins, and scutello-mesothoracic suture narrowly but quite densely pale tomentose; pleura and lateral faces of propodeum fuscous or blackish pubescent in general, but a few pale hairs on pleura above; posterior face of propodeum pale pubescent; legs largely fuscous pubescent basally, the front and mid tibiae with some basal pale pubescence on outer face, their tarsi brownish pubescent beneath; hind tibial scopa pale yellowish, hairs rather sparsely plumose; basal abdominal tergum with intermixed dark and light hairs basally, disc with shorter, suberect, black pubescence which is rather conspicuous if viewed in profile; tergum 2 with a basal, whitish, tomentose band, largely covered by the preceding tergum, disc otherwise with very short, black, suberect pubescence; tergum 3 black pubescent across base, with a median, rather broad, whitish tomentose fascia that is somewhat narrowed or interrupted medially, the impressed apical area largely blackish pubescent; tergum 4 blackish pubescent across base, with some whitish tomentum medially adjacent to the apical impressed area, this densely pale tomentose on each side, bare medially; tergum 5 largely black pubescent, but with a whitish patch on each extreme side, apical fimbria rather short and more fuscous.

MALE—Length 9.5-12.5 mm., breadth of abdomen 3.5-5 mm.; black, the clypeus bright yellow, labrum and mandibles largely black but mandbiles with an apical testaceous maculation; antennal flagella brownish-testaceous beneath, piceous above; legs dark, tarsal segments becoming brownish-testaceous apically, mid and hind spurs pale yellowish; tegulae brownish; wings very faintly infuscated, veins brownish to piceous; rims of abdominal terga very narrowly yellowish-hyaline; cheeks considerably narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; mandibles with a small, inner, subapical tooth or angle; basal segment of flagellum slightly longer than pedicel, segment 2 about five times longer than shorter side of the 1st; punctures of clypeus quite coarse, deep and somewhat separated along upper margin, becoming more finely and closely punctate apically; median length of labrum considerably less than breadth, rather broadly rounded, slightly emarginate medially, punctures fine, close and deep; supraclypeal area rather dull, punctures irregular but rather well separated; lateral areas of face below antennae dull, very finely and closely punctate, dorsal areas more shining, punctures somewhat coarser, deep and distinct; cheeks very finely and closely punctate beneath rather dense pubescence; scutum shining between quite coarse and deep puncturs, these somewhat separated posteriorly near mid-line, closer laterally and anteriorly; scutellum shining, somewhat more finely but uniformly closely punctate; pleura dull, tessellate, punctures rather coarse and close; posterior face of propodeum shining, punctures rather fine but deep and close, dorsal area polished below, becoming rather coarsely, deeply punctate across upper margin, lateral faces rather dull, punctures shallow but very close and rather fine; abdominal terga well punctured throughout, punctures quite coarse and deep but well separated on the more basal terga, becoming much finer and closer laterally, punctures of apical impressed areas only slightly finer than those toward base, somewhat finer and much closer on the more apical terga, being crowded and very fine laterally on 3-6; tergum 6 with a conspicuous apical angle at each extreme side, and tergum 7 with a corresponding, more slender spine; pubescence copious, elongate and quit dense on head and thorax, largely pale ochraceous on head, scutum with considerably fuscous pubescence across posterior half, and a few shorter dark hairs on scutellum medially, otherwise thorax largely pale ochraceous pubescent; legs en-

tirely pale pubescent; basal abdominal tergum with copious, elongate, pale ochraceous pubescence across base, disc with shorter but erect and quite conspicuous black pubescence; tergum 2 with a dense, whitish, basal fascia that is covered in part by the preceding tergum, the disc black pubescent; tergum 3 black pubescent across base, with a quite broad and dense, median, whitish fascia, the apical impressed area black pubescent; tergum 4 with rather copious, elongate and erect, black pubescence, with a dense whitish fascia on each side which is narrowly connected across the disc with some obscure pale tomentum, the median area of the impressed margin black pubescent; tergum 5 broadly white pubescent apically on each side of mid-line, disc with long, erect, black pubescence; terga 6 and 7 entirely black pubescent; median length of pygidial plate somewhat greater than basal width, margins carinate, rather strongly converging to the rather broad, subtruncate apex; sterna 7 and 8 and genital armature as shown (fig. 78).

DISTRIBUTION—Colorado to New Jersey, south to Texas and Florida, May to August, but with early and late records in April and September in Florida.

FLOWER RECORDS — *Melilotus* and *Pontederia*. Recorded by Robertson (1929) on *Asclepias, Blephilia, Cassia, Cephalanthus, Dianthera, Lippia, Lythrum, Psoralea, Pycnanthemum, Teucrium* and *Verbena*.

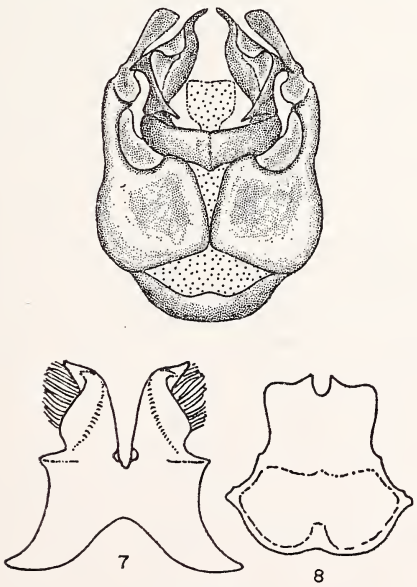


Figure 78
Genital armature and sterna 7 and 8 in male of *Florilegus condignus*.

Svastra Holmberg

Svastra Holmberg, 1884. Acad. Nac. Cienc. Cordoba Actas 5, p. 127. Type: *Svastra bombilans* Holmberg. Orig. desig.

Melissodes subg. *Brachymelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37, p. 926. Type: *(Eucera cressonii* Dalla Torre) = *Melissodes brevicornis* Cresson. Orig. desig.

Epimelissodes Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 63. Type: *Melissodes atripes* Cresson. Monob.

Svastra subg. *Epimelissodes* Moure and Michener, 1955. Dusenia 6, p. 297.

Melissodes subg. *Epimelissodes* LaBerge, 1956. Kans. Univ. Sci. Bul. 37, pp. 932-1027. (revision)

These are robust, hairy bees, some of them approaching in size the queens of *Bombus*. The genus is closely related to *Melissodes*, and only recently have the included species been removed from that genus. As in *Melissodes*, the mandibles are simple in both sexes, the maxillary palpi are 4-segmented, the scopa is plumose, and the clypeus is contiguous with the margin of the eyes laterally, and is black in the female, yellow in the male. Males differ from those in *Melissodes* chiefly in the form of tergum 7 which is not spinose laterally, and the pygidial plate is not distinctly notched laterally, but is more gradually narrowed apically. Tergum 6, however, is conspicuously angulate or spinose laterally. In the female the metanotum bears a conspicuous median tuft of elongate hairs, markedly differing in length from the shorter, more lateral hairs. In both sexes the cheeks are about half width of eyes in profile, clypeus nearly flat.

KEY TO SPECIES

Females

1. Scopal hairs dark, plumose only toward base 2
   Scopal hairs pale, densely plumose .. 4
2. Hind tibiae with pale ochraceous hairs along outer surface medially .... *atripes georgica* (Cresson) (p. 259)
   Scopal hairs on hind tibiae entirely black 3
3. Abdominal terga 3 and 4 usually with lateral, oblique, whitish fasciae ....*atripes atripes* (Cresson) (p. 257)
   Abdominal terga not fasciate, the general aspect black ....*atripes atrimitra* (LaBerge) (p. 259)

4(1). Apical half of abdominal terga 2 and 3 densely pale tomentose to the rims.. ..... *petulca* (Cresson) (p. 261)

Terga 2 and 3 with narrow, submedian, slightly oblique, pale fasciae which are interrupted medially 5

5. Pleural pubescence entirely pale .... *aegis* (LaBerge)
Pleural pubescence largely or entirely black 6

6. Anterior third of scutum with brownish pubescence; terga 2 and 3 with subbasal, slightly oblique, pale fasciae, interrupted medially; apical half of tergum 4 largely pale pubescent .... *obliqua obliqua* (Say) (p. 259)
Scutum largely or entirely black pubescent; pale fasciae of abdominal terga reduced or absent ..... *obliqua caliginosa* (Cresson) (p. 261)

Males

1. Apical half of abdominal terga 2 and 3 pale tomentose, lacking any area of black pubescence toward the rims .... *petulca* (Cresson) (p. 261)
Apical areas of terga 2 and 3 largely black pubescent, the pale tomentose fasciae submedian in position 2

2. Apical areas of terga 2-4 distinctly although finely punctate, the surface shining 3
Punctures of apical areas of terga 2-4 exceedingly minute and indistinct, the surface dull 5

3. Terga 3 and 4 with entire, white pubescent fasciae, that on 2 narrow and widely interrupted medially .... *atripes georgica* (Cresson) (p. 259)
Tergum 4 entirely black, 2 and 3 with at most very narrow, submedian white fasciae that are interrupted medially (2 is densely fasciate across base) .. 4

4. Terga 2 and 3 usually with narrow submedian white fasciae, these more or less interrupted medially .... *atripes atripes* (Cresson) (p. 257)
Fasciae on terga 2 and 3 reduced or absent *atripes atrimitra* (LaBerge) (p. 259)

5(2). Mesopleura with dense pale pubescence anteriorly and below which completely hides the surface .... *aegis* (LaBerge)
Anterior face of mesopleura only thinly pubescent, the surface exposed 6

6. Abdominal fasciae usually well developed: legs and pleura entirely pale pubescent ..... *obliqua obliqua* (Say) (p. 259)
Abdominal fasciae reduced or absent; legs and pleura with considerable fuscous pubescence ..... *obliqua caliginosa* (Cresson) (p. 261)

Svastra (Epimelissodes) aegis (LaBerge)

(Fig. 79)

Melissodes (Epimelissodes) aegis LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 959.
Svastra (Epimelissodes) aegis LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

FEMALE—Length 14-18 mm., breadth of abdomen 5-6.5 mm.; black, the mandibles over basal half, labrum, and apical margin of clypeus dull testaceous, flagellum beyond segment 2 brownish-testaceous beneath, black above, tegulae testaceous, and apical tarsal segments becoming testaceous; wings quite uniformly pale brownish, veins brownish to piceous; apical margin of tergum 1 narrowly testaceous; median length of clypeus somewhat greater than half the distance between eys below; eyes subparallel; basal segment of flagellum nearly one and a half times length of segment 2, the latter considerably longer than broad; clypeus dull and tessellate, punctures rather shallow, well separated, becoming finer and very close toward the narrow, impunctate, apical rim, those on labrum closer and deeper; face above antennae more shining, median punctures quite coarse, deep and distinct, becoming exceedingly minute, barely distinguishable between eyes and ocelli; scutum and scutellum with moderately coarse and deep, subcontiguous punctures, pleura more coarsely punctate, punctures well separated in part, surface smooth and shining; propodeum posteriorly dull and densely tessellate, rather shallowly punctate, dorsal surface subreticulate, lateral faces shining anteriorly and below, the punctures obsolescent; dorsal surface of basal abdominal tergum coarsely, deeply and rather closely punctate across basal half, punctures approaching apical margin on each extreme side, apical half of disc rather smooth, punctures inevident; terga 2 and 3 dull, very finely, closely and obscurely punctate across base, broad apical areas smooth and microscopically punctate; terga 4 and 5 quite densely rugose or reticulate across base; pygidium subtriangular, apex rather narrowly rounded; pubescence of head entirely pale ochraceous, scutellum and posterior half of scutum with short fuscous pubescence, the scutello-mesothoracic suture densely whitish pubescent, thorax otherwise pale ochraceous pubescent; pubescence of legs pale ochraceous in large part, scopa whitish-yellow, hairs quite densely plumose apically, front basitarsi with some brownish-fuscous pubescence on outer surface; abdominal tergum 2 with a transverse, basal, yellowish-white fasciae, 2 and 3 with lateral, oblique, whitish fasciae that are more or less separated medially; apical half of tergum 4 densely covered with whitish to-

mentum, somewhat thinner medially, the more basal areas of these terga with obscure, subappressed, dark pubescence, a few elongate hairs overlying the fasciae; tergum 5 with rather dense, black pubescence basally, more brownish apically, forming a dense apical fimbria.

MALE—Length 14-17 mm., breadth of abdomen 5.5-6.5 mm.; black, the entire clypeus, labrum and basal half of mandibles bright yellow, mandibles piceous apically but with an outer, oblong, orange spot; antennal flagellum brownish-ferruginous beneath, becoming somewhat paler toward base, blackish above; tegulae testaceous, wings uniformly pale brownish or yellowish, veins piceous; apical tarsal segments becoming testaceous, spurs pale yellow; median length of clypeus two-thirds distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum nearly three times length of shorter side of segment 1; punctures of lateral areas of face and around antennae fine but close, deep and distinct beneath the pubescence, vertex becoming smooth and shining between eyes and ocelli, punctures hardly visible, those on clypeus somewhat coarser but very obscure, quite close, coarse, deep and distinct on labrum; scutum, scutellum and pleura with coarse, deep and close punctures, interspaces more or less shining, those on pleura somewhat coarser; propodeum dull and tessellate posteriorly, with rather coarse and close punctures, dorsal face coarsely rugoso-punctate, lateral faces becoming smooth and shining anteriorly and below, the punctures obsolescent; dorsal surface of basal abdominal tergum coarsely, deeply and rather closely punctate across basal half, punctures approaching apical margin on each extreme side, apical half of disc rather smooth, punctures inevident; terga 2 and 3 dull, very finely, closely and obscurely punctate across base, broad apical areas smooth and only microscopically punctate; terga 4 and 5 quite densely rugoso-punctate across base, apical areas with only minute, obscure and hardly visible punctures; pubescence of head entirely pale ochraceous, fuscous on scutellum and posterior half of scutum, the scutello-mesothoracic suture with some fine, pale yellowish, suberect hairs, thorax otherwise with pale ochraceous pubescence, that on legs pale ochraceous to whitish; basal half of abdominal tergum 1 entirely and quite densely pale ochraceous pubescent, apical half practically bare, with only a few dark, subappressed hairs toward each extreme side, terga 2-4 with somewhat oblique transverse whitish fasciae which are more or less widely interrupted medially, tergum 2 with a basal, transverse, white fascia, a narrow intervening area with short fuscous pubescence; basal areas of 3 and 4 with dark, appressed pubescence and scattered, erect, blackish hairs, apical areas of these terga bare; terga 5 and 6 largely black pubescent (pale in some specimens), 5 with a more or less evident, transverse, whitish fascia, usually rather widely interrupted medially, the tergum with a low angle at each extreme side; tergum 6 with a pair of robust lateral spines; median length of pygidial plate about two-thirds basal width, strongly narrowed apically, with a slight notch on each side toward the rather broadly truncate apex; sterna 7 and 8 and genital armature as shown (fig. 79).

DISTRIBUTION—Texas to Florida and North Carolina, July to October.

FLOWER RECORDS—*Chrysopsis, Helenium, Helianthus* and *Kuhnistera.* LaBerge (1956) also lists *Aster, Gaillardia* and *Vernonia.*

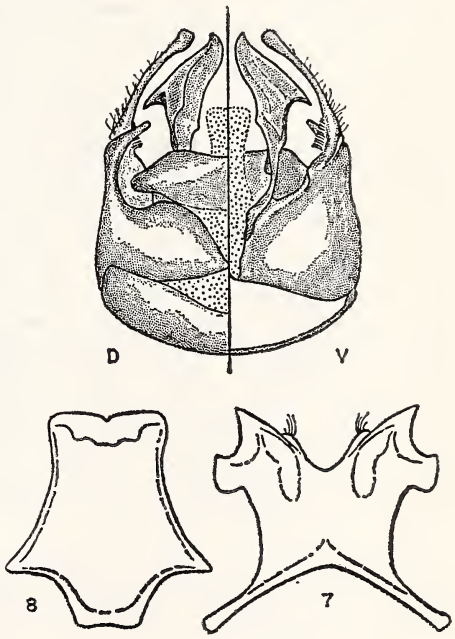


Figure 79
Genital armature and sterna 7 and 8 in male of *Svastra aegis.*

Svastra (Epimelissodes) atripes atripes (Cresson)

(Fig. 80)

Melissodes atripes Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 275. ♀.
Melissodes atripes Robertson, 1898. Acad. Sci. St. Louis, Trans. 8, p. 54. ♀ ♂.
Epimelissodes atripes Ashmead, 1899. Ent. News 10, p. 245.

Epimelissodes atripes Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Svastra (Epimelissodes) atripes Moure and Michener, 1955. Dusenia 6, p. 298. (new combination)

Melissodes (Epimelissodes) atripes atripes LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 948.

Svastra (Epimelissodes) atripes LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 267.

FEMALE—Length 15-20 mm., breadth of abdomen 6-8 mm.; black, mandibles black basally, red apically, with a yellow maculation along apical half; tegulae testaceous to brownish; wings more or less deeply infuscated and violaceous; basal segment of flagellum nearly twice as long as segment 2, the latter slightly longer than broad; median length of clypeus about half distance between eyes below; eyes subparallel; pleura and dorsum of thorax closely and coarsely punctate, propodeum tessellate, dorsal face finely and densely rugose; discs of abdominal terga closely, finely and distinctly punctate, surface dull, apical rims narrowly impunctate; pubescence of head and thorax largely pale ochraceous, with some dark hairs on face laterally and on vertex behind ocelli, black on mesopleura anteriorly and beneath; legs with black or piceous pubescence; anterior face of basal abdominal tergum black pubescent, dorsal face with copious pale pubescence across basal half, apical half nearly bare; tergum 2 with a basal white fascia, largely covered by apical rim of the preceding disc; terga 3 and 4 usually with oblique, lateral, whitish fasciae; discs of terga otherwise covered with very fine, short, appressed, black hairs that do not obscure surface, but tergum 5 with a dense fimbria of black, plumose hairs; apex of pygidial plate rather broadly rounded.

MALE—Length 13-18 mm., breadth of abdomen 4.5-7 mm.; black, the clypeus, labrum and base of mandibles yellow, mandibles blackened apically but with a broad, outer, more testaceous maculation over apical third; flagellum testaceous beneath, piceous above, but basal segment somewhat more brownish; apical tarsal segments and spurs brownish-testaceous; tegulae testaceous; wings pale yellowish-brown, veins testaceous to brownish; clypeus not markedly protuberant, its median length somewhat greater than half the distance between eyes below; eyes subparallel; shorter side of basal segment of flagellum nearly equal to apical width, segment 2 about three times this length; punctures of clypeus very fine, well but not widely separated and rather obscure, those of labrum somewhat deeper and more distinct and close; lateral areas of face above clypeus quite closely, finely and deeply punctate, punctures becoming minute on the shining surface between eyes and ocelli; cheeks with minute, slightly separated and obscure punctures; scutum, scutellum and pleura coarsely, deeply and closely punctate, the punctures obscured by dense pubescence; posterior face of propodeum with somewhat finer, more widely separated punctures, dorsal face rather finely rugose, lateral faces more shining, punctures becoming somewhat finer anteriorly and below; abdominal terga closely, deeply and distinctly punctate, the punctures rather coarse across base of each plate, the broad apical impressed areas much more finely and closely, but distinctly punctate, only the narrow apical rims impunctate; tergum 5 slightly angulate at each extreme side, and tergum 6 with a robust, triangular, apical spine at each side; pubescence quite dense and erect, entirely pale ochraceous over entire head and thorax; front legs largely pale pubescent, with a brown patch on tibiae apically, mid and hind legs largely blackish or piceous pubescent; basal abdominal tergum ochraceous pubescent over basal half and on lateral margins, remainder of disc with very short, inconspicuous, suberect, blackish pubescence; tergum 2 with a conspicuous, basal, pale ochraceous or whitish fascia that is covered in part, at least, by tergum 1; terga 2 and 3 with submedian, slightly oblique, narrow, whitish fasciae, interrupted medially and often very poorly developed; discs of all terga otherwise covered with very short and inconspicuous, subappressed, blackish pubescence, sometimes with a few pale hairs laterally, the more apical terga with some elongate, more erect, dark hairs; median length of pygidial plate considerably less than basal width, somewhat narrowed apically, slightly constricted just before the broadly rounded or subtruncate apex; sternum 7 as shown (fig. 80); sternum 8 and genital armature similar to those in *aegis* (fig. 79).

DISTRIBUTION—This typical form is primarily western in its range, occurring from New Mexico and Colorado to Louisiana and Illinois, and is in flight in various parts of this range from March to October.

FLOWER RECORDS—LaBerge (1956) lists the following: *Asclepias, Bidens, Cassia, Cleome, Dalea, Gaillardia, Gonolobus, Gossypium, Helianthus, Ipomoea, Lythrum, Melilotus, Pycnanthemum, Thelesperma, Verbena* and *Vernonia.*

Svastra (Epimelissodes) atripes atrimitra (LaBerge)

Melissodes atrifrons Cockerell, 1906. Amer. Ent. Soc. Trans. 32, pp. 79 & 82. (not Smith)

Melissodes carolinensis Brimley, 1938. Insects of North Carolina, p. 462. (not Dalla Torre)

Melissodes (Epimelissodes) atripes atrimitra LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 949.

Svastra (Epimelissodes) atripes atrimitra LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

Females of this form agree in most details with typical *atripes*, but the oblique pale fasciae on terga 2 and 3 are entirely lacking, and the scopal hairs on the hind tibiae and basitarsi are entirely black. In the males also these fasciae are either absent or much reduced.

DISTRIBUTION — Alabama and Georgia to New Jersey, with one record from Indiana, July to November.

FLOWER RECORDS — *Afzelia, Buddleia, Chamaecrista, Kuhnistera, Monarda* and *Rhus*. LaBerge (1956) also lists *Bradburya, Gerardia, Gossypium, Hibiscus, Koellia, Passiflora* and *Primula*.

Svastra (Epimelissodes) atripes georgica (Cresson)

Melissodes georgica Cresson, 1878. Acad. Nat. Sci. Phila., Proc. 30, p. 200. ♂.

Melissodes (Epimelissodes) atripes georgica LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 951.

Svastra (Epimelissodes) atripes georgica LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

The females of this form may be separated from either typical *atripes* or *atrimitra* by the presence of pale hairs in the scopa of the hind tibiae although the basitarsal scopal hairs are entirely black. Usually there are oblique, white fasciae on abdominal terga 3 and 4, but these are sometimes reduced or absent. In males also there is a much greater development of the white fasciae on the abdominal terga with conspicuous, more or less oblique, white fasciae on terga 3 and 4 and usually also 2; and the pubescence of the outer surface of the mid and hind tibiae is considerably paler than in either of the other forms.

DISTRIBUTION—Georgia and Florida, July to October.

FLOWER RECORDS—*Bidens* and *Rhus*.

Svastra (Epimelissodes) obliqua obliqua (Say)

(Fig. 80)

Macrocera obliqua Say, 1837. Boston Jour. Nat. Hist. 1, p. 403. ♂.

Melissodes obliqua Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 275.

Epimelissodes obliqua Robertson, 1918. Ent. News 29, p. 92.

Melissodes obliqua Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 34. (biology)

Epimelissodes obliqua Robertson, 1928. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Melissodes obliqua Custer, 1928. Canad. Ent. 60, p. 28. (biology)

Svastra (Epimelissodes) obliqua Moure and Michener, 1955. Dusenia 6, p. 298. (new combination)

Melissodes (Epimelissodes) obliqua obliqua LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 986.

FEMALE—Length 14.5-16 mm., breadth of abdomen 6-6.5 mm.; black, labrum and narrow margin of clypeus somewhat more brownish, mandibles with a large orange maculation apically, segment 2 of flagellum more ferruginous, the segments beyond paler brownish beneath, black above, tegulae more testaceous but largely covered with fuscous pubescence; wings quite uniformly lightly infuscated, veins brownish to piceous, basal abdominal tergum narrowly rimmed with yellowish; median length of clypeus slightly more than half the distance between eyes below; eyes sub-parallel; basal segment of flagellum somewhat less than twice the length of segment 2, shorter side of 2 about equal to the breadth; clypeus dull, punctures rather coarse and close but not crowded, labrum somewhat more shining, punctures somewhat deeper and more distinct, but about equal in diameter to those of clypeus; upper part of face more shining, punctures minute but rather close between eyes and ocelli; scutum and scutellum somewhat shining between close, deep and distinct punctures, those on scutellum somewhat finer; punctures of pleura somewhat more coarse and shallow; posterior face of propodeum dull, tessellate, punctures rather fine and sparse, dorsal face rather densely rugoso-punctate, lateral faces becoming somewhat smooth and shining below, punctures otherwise very fine and close; basal abdominal tergum quite coarsely and closely punctate across basal half of disc, punctate area reaching apical margin at extreme sides, the broad apical area smooth, with only microscopic punctures that are barely visible at high magnification; terga 2 and 3 with narrow basal areas that are finely and quite closely punc-

tate, the broad apical area smooth, similar to that of tergum 1; basal areas of terga 5 and 6 rather finely rugoso-punctate, apical areas obscured by pubescence; pygidium triangular, with narrowly rounded apex; pubescence of head largely ochraceous, with only a few fuscous hairs on vertex laterally and above eyes; scutellum and posterior half of scutum with copious short, erect, blackish or fuscous pubescence, and pleura and lateral faces of propodeum entirely black pubescent, anterior half of scutum, pronotum including tubercles, a narrow fringe on the scutello-mesothoracic suture, a posterior fringe around margin of scutellum, and posterior face of propodeum, pale ochraceous pubescent; pubescence of legs largely blackish or piceous, more brownish fuscous on outer surface of mid tibiae, but scopa pale yellowish-ochraceous, the hairs strongly plumose apically; basal half of tergum 1 ochraceous pubescent, but anterior face with copious fuscous pubescence; tergum 2 with a basal, transverse, pale ochraceous fascia which is largely covered by disc of tergum 1; terga 2 and 3 with narrow, oblique, pale ochraceous fasciae that are rather widely interrupted medially, with some short fuscous or blackish pubescence between these and base; tergum 4 with a broad, dense, apical, transverse, ochraceous fascia, the basal area black pubescent; and tergum 5 black pubescent basally, more fuscous apically, forming a dense fimbria of long fuscous hairs.

MALE—Length 14.5-16 mm., breadth of abdomen 5.5 mm.; black, the clypeus, labrum and base of mandibles bright yellow, mandibles darker apically but with a subapical orange maculation; antennal flagellum more brownish beneath, blackish above; apical tarsal segments becoming reddish-testaceous, spurs pale testaceous or yellowish; tegulae testaceous; wings very uniformly lightly infuscated, veins brownish to piceous; apical rim of basal abdominal tergum very narrowly yellowish-hyaline; median length of clypeus about two-thirds breadth between eyes below; eyes very slightly convergent below; shorter side of basal segment of flagellum about equal to its apical width, segment 2 nearly three times this length; punctures of clypeus very fine, shallow and obscure, well separated, those on labrum much more deep, distinct and close; upper part of face becoming smooth and shining, punctures between eyes and ocelli very fine and well separated, somewhat closer and coarser toward margin of clypeus below; scutum and scutellum somewhat shining between deep and distinct punctures, those on scutum somewhat more coarse and sparse than those on scutellum which are close but not crowded; pleura with rather coarse, slightly separated but rather shallow punctures; posterior face of propodeum dull and tessellate, punctures rather coarse but shallow and rather sparse, dorsal face very densely tessellate, median punctures very shallow and widely separated, becoming finer and very close laterally, lateral faces becoming smooth and shining below and anteriorly, the punctures obsolescent; disc of basal abdominal tergum quite coarsely and deeply punctate, the more median punctures well separated, becoming closer laterally where they approach the apical margin, apical third smooth, somewhat shining and only microscopically punctate; basal areas of terga 2-4 rather closely and distinctly punctate, apical areas smooth and only microscopically punctate; terga 5 and 6 densely and finely punctate across base, 5 with small but rather distinct lateral angles, 6 with a pair of triangular, lateral, apical spines; scutellum and posterior half of scutum with copious, erect but rather short, fuscous pubescence, otherwise entire head, thorax, legs and basal abdominal tergum with copious, pale ochraceous pubescence; tergum 2 with a broad, basal, pale ochraceous fascia and a pair of narrower oblique fasciae which are only slightly separated; terga 3 and 4 with transverse, slightly oblique, pale ochraceous fasciae, basal area of each with some more erect, darker pubescence; tergum 5 with largely pale pubescence, with a transverse, submedian, rather narrow, ochraceous fascia; pubescence of tergum 6 largely pale, long and erect; median length of pygidial plate very slightly less than basal width, subtriangular, rather abruptly but slightly constricted toward apex which is broadly rounded or sub-

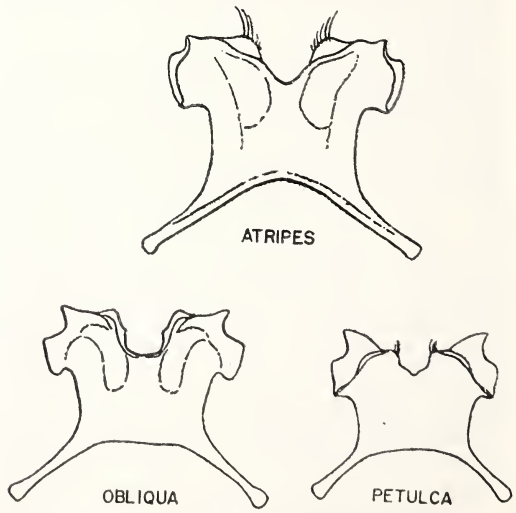


Figure 80
Sternum 7 in males of *Svastra*.

truncate; sternum 7 as shown (fig. 80); sternum 8 and genital armature similar to those in *aegis* (fig. 79).

DISTRIBUTION — Mexico to Montana, east to Quebec, New Jersey, Tennessee and Florida, April to October. From Georgia to Maryland it is largely replaced by *caliginosa*.

FLOWER RECORDS — LaBerge (1956) lists one or more species of each of the following: *Abutilon, Ambrosia, Asclepias, Aster, Bidens, Blephia* (?), *Boltonia, Carduus, Cassia, Cephalanthus, Chrysopsis, Cirsium, Cleome, Coreopsis, Echinacea, Erigeron, Euphorbia, Gaillardia, Gossypium, Grindelia, Helenium, Helianthus, Heliopsis, Ipomoea, Kuhnistera, Lacinaria, Lactuca, Lobelia, Lythrum, Medicago, Melilotus, Monarda, Nepeta, Oenothera, Petalostemum, Prionopsis, Psoralea, Pycnanthemum, Ratibida, Rudbeckia, Schrankia, Silphium, Solidago, Teucrium, Trifolium, Verbena, Vernonia, Verbesina* and *Zinnia*.

Svastra (Epimelissodes) obliqua caliginosa (Cresson)

Melissodes caliginosa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 192. ♀ ♂.
Melissodes (Epimelissodes) obliqua caliginosa LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 984.
Svastra (Epimelissodes) obliqua caliginosa LaBerge, 1958. Kans. Ent. Soc. Jour. 31, p. 273.

FEMALE—This is a black pubescent form of *obliqua* that averages slightly longer than the typical form in the East, ranging from 15 to 17 mm. in length. Except for some inconspicuous pale hairs in the scutello-mesothoracic suture, the pubescence of the entire head, thorax, legs and basal abdominal tergum is black, and there is a total lack of pale pubescent fasciae. Only the tibial scopa is pale ochraceous, copiously plumose as in typical *obliqua*, but the hairs on the hind basitarsi apically become largely blackish; the tegulae are black but the wing color is similar to *obliqua*, and the mandibles and spurs resemble that form in color.

MALE—The differences in this sex also are chiefly in color of pubescence, the pleura, lateral faces of propodeum and anterior face of basal abdominal tergum being largely black pubescent. The front legs are largely pale pubescent, but the mid and hind legs are covered with darker, more fuscous or piceous hairs, with some pale intermixture; the basal fascia of tergum 2 is more or less diluted with blackish and the oblique fasciae of terga 2-4 are reduced or absent.

Varying degrees of intergradation between these two forms are of common occurrence.

DISTRIBUTION — Georgia to New Jersey, June to November.

FLOWER RECORDS — *Borrichia, Cirsium, Cucurbita, Helenium, Helianthus* and *Vernonia*.

Svastra (Epimelissodes) petulca petulca (Cresson)

(Fig. 80)

Melissodes petulca Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 201. ♀.
Melissodes illinoensis Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 126. ♀ ♂.
Epimelissodes illinoensis Robertson, 1918. Ent. News 29, p. 92.
Epimelissodes illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Svastra (Epimelissodes) petulca Moure and Michener, 1955. Dusenia 6, p. 298. (new combination)
Melissodes (Epimelissodes) petulca petulca LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1012.

FEMALE—Length 12.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, labrum yellow, mandibles somewhat yellowish toward base but dark over apical two-thirds, with an elongate orange maculation extending over apical half; segments of flagellum beyond the 2nd brownish-piceous beneath, black above, basal segments darker; tarsal segments of legs becoming testaceous, and spurs testaceous; tegulae testaceous posteriorly, with a covering of dark, dense pubescence over anterior half; wings hyaline basally, becoming very faintly clouded apically, veins brownish to piceous; apical margin of basal abdominal tergum narrowly yellow; median length of clypeus about half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum fully twice as long as shorter side of segment 2, the latter very slightly shorter than the apical width; clypeus rather dull, punctures deep, close and rather coarse, labrum somewhat more shining, punctures deeper, subcontiguous and more distinct; face shining between ocelli and antennae, punctures exceedingly minute and barely evident; scutum and scutellum with deep, distinct, close and moderately coarse punctures, those on pleura considerably coarser and somewhat more widely separated; propodeum rather dull and tessellate posteriorly, becom-

ing somewhat more shining below, punctures rather coarse and distinct, slightly separated, dorsal face more densely rugoso-punctate, lateral faces becoming smooth and shining anteriorly and below, the punctures obsolescent; basal abdominal tergum rather closely and coarsely punctate across basal half, the punctures becoming quite sparse and obscure toward the shining, impunctate, apical half, lateral areas more fully punctate; terga 2 and 3 with only exceedingly minute, scattered punctures over apical half, these barely visible, basal areas more closely and deeply but still rather obscurely punctate; tergum 4 finely rugose across basal half; pygidium triangular, narrowly rounded at apex; pubescence of head entirely pale, more ochraceous on vertex, whitish on face and cheeks; scutellum and posterior two-thirds of scutum with dense fuscous pubescence, the scutello-mesothoracic suture with a dense, pale ochraceous fascia, thorax otherwise ochraceous pubescent, becoming somewhat more whitish below and posteriorly; legs entirely pale pubescent, yellowish in large part, the scopa pale yellowish, hairs quite densely plumose; basal half and lateral margins of basal abdominal tergum quite copiously ochraceous pubescent; tergum 2 with a basal, transverse, pale ochraceous fascia, and apical halves of terga 2-4 completely covered with quite dense, appressed, whitish tomentum to the rims, basal half of each with very short, subappressed, fuscous pubescence, becoming suberect laterally, 4 with numerous erect fuscous hairs which overly in part the apical white tomentose area; tergum 5 with dense fuscous to blackish tomentum basally, this forming a quite dense apical fimbria which is dark medially, becoming more or less pale laterally.

MALE—Length 11-13 mm., breadth of abdomen 4-5 mm.; black, entire clypeus, labrum and base of mandibles bright yellow, mandibles darker apically but with a subapical, more orange maculation; flagellum brownish-testaceous beneath, more piceous above (paler in some specimens); tegulae yellowish-hyaline posteriorly, anterior half densely pale pubescent; wings subhyaline, very faintly clouded apically, veins brownish-testaceous; apical tarsal segments becoming testaceous; spurs pale yellow; apical margins of abdominal terga more or less yellowish-hyaline; median length of clypeus considerably more than half the distance between eyes below, about half the distance between eyes above, the eyes thus somewhat convergent below; segment 2 of flagellum nearly three times the shorter side segment 1; punctures of clypeus fine, well separated and distinct; labrum much more closely and deeply punctate; face above clypeus quite closely and deeply punctate, vertex becoming smooth and shining with barely perceptable, minute punctures; punctures of scutum, scutellum and pleura deep and distinct, rather coarse, quite well separated in center of disc of scutum posteriorly, somewhat finer and closer on scutellum, rather close, coarse, deep and distinct on pleura; propodeum posteriorly dull and tessellate, punctures shallow but rather coarse, dorsal face becoming rather coarsely rugoso-punctate laterally, lateral faces narrowly shining anteriorly and below, punctures otherwise quite coarse and close; basal abdominal tergum quite deeply and distinctly punctate over anterior half, the punctures well separated medially, becoming quite close laterally, median apical area impunctate; basal areas of terga 2-4 with fine, close, rather distinct punctures, the broad apical area with only exceedingly minute, hardly evident punctures; tergum 5 finely and densely rugose across base, slightly angulate at each extreme side; tergum 6 with robust, lateral, triangular spines; pubescence entirely pale on head, somewhat tinged with yellow on vertex, otherwise white; scutellum and posterior half of scutum with dense, rather copious and erect, fuscous to brownish pubescence, the scutello-mesothoracic suture quite densely pale tomentose, pubescence of thorax otherwise pale ochraceous, that along anterior face of mesopleura becoming densely appressed and quite strongly yellowish; pubescence of legs largely whitish; basal abdominal tergum with copious, long and erect, pale ochraceous pubescence, this lacking over the apical third medially; tergum 2 with a transverse, basal, whitish fascia that is largely covered by the preceding tergum, and terga 2 and 3 largely covered over apical half with appressed whitish pubescence that nearly reaches the apical rims; terga 4 and 5 with transverse, whitish fasciae that are subapical but usually complete, basal areas of these discs largely covered with short, subappressed, dark pubescence and with numerous, more or less erect, longer hairs, these pale in part; median length of pygidial plate slightly less than basal width, rather strongly narrowed apically, slightly incurved on each side toward the broadly rounded apex, but not notched; sternum 7 as shown (fig. 80); sternum 8 and genital armature similar to those in *aegis* (fig. 79).

DISTRIBUTION—Texas to Kansas, east to Florida and New Jersey. April to September.

FLOWER RECORDS—LaBerge (1956) lists the following: *Borrichia, Coreopsis, Gaillardia, Gossypium, Helenium, Helianthus, Lepachys, Lithospermum, Monarda, Pycnanthemum, Pyrrhopappus, Ratibida, Rudbeckia* and *Verbesina.*

Table 8—Distribution of species of *Exomalopsis, Ptilothrix, Melitoma, Peponapis, Xenoglossa, Cemolobus, Anthedonia, Florilegus* and *Svastra* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Exomalopsis	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
asteris										X																	
micheneri																								X			
pulchella																											X
similis																											X
Ptilothrix																											
bombiformis									X		X	X		X		X			X			X		X	X	X	X
Melitoma																											
taurea									X	X	X	X							X		X	X	X	X	X	X	X
Peponapis																											
pruinosa		X		X	X			X	X	X			X	X	X				X		X	X				X	
Xenoglossa																											
kansensis																						X				X	
strenua									X										X			X		X		X	X
Cemolobus																											
ipomoeae									X													X				X	
Anthedonia																											
compta									X	X												X				X	
Florilegus																											
condignus									X	X				X								X			X	X	X
Svastra																											
aegis																						X	X	X	X	X	X
atripes										X																	
a. atrimitra										X				X		X			X			X	X		X	X	
a. georigica																										X	X
obliqua							X	X	X	X			X	X							X			X	X		X
o. caliginosa														X		X			X			X	X			X	
petulca									X					X								X	X	X	X	X	X

LaBerge (1956) considers *suffusa* Cresson in the West a subspecies of *petulca*, thus making the subspecific designation of this typical form desirable.

Melissodes Latreille

(Fig. 67)

Melissodes Latreille, 1829. *In* Cuvier, Règne Animale, ed. 3, v. 5, p. 354. Type: *Melissodes leprieuri* Blanchard, 1849. First included species.

Melissodes Cockerell, 1905. Amer. Ent. Soc. Trans. 31, pp. 328-330.

Melissodes Cockerell, 1906. Amer. Ent. Soc. Trans. 32, pp. 74-92.

Melissodes LaBerge, 1956. Univ. Kans. Sci. Bul. 37, pp. 911-1194. (revision—part 1)

Melissodes LaBerge, 1956. Univ. Kans. Sci. Bul. 38, pp. 533-578. (revision—part 2)

Melissodes LaBerge, 1961. Univ. Kans. Sci. Bul. 42, pp. 283-663. (revision—part 3)

This is a large genus of moderately robust hairy bees. The mandibles are simple in both sexes, and the maxillary palpi are usually 4-segmented. The clypeus laterally is contiguous with the margin of the eye and is black in the females, yellow, at least in part, in the males. The scopa is plumose, tergum 7 in the males is distinctly spinose at base on each extreme side, and the pygidial plate is distinctly notched on each side toward the apex. In the female the pubescence of the metanotum is ordinary, lacking the elongate median tuft of hairs that distinguishes the closely related *Svastra*.

KEY TO SPECIES

Females

1. Scopa on hind legs entirely black ..... *bimaculata nulla* LaBerge (p. 269)
   Scopa pale 2
2. Abdomen black pubescent, without evident spots or fasciae of pale pubescence, except possibly a basal fascia on segment 2 which is usually covered by the disc of segment 1 3
   Abdomen with spots or fasciae of pale pubescence on segments 3 or 4 6
3. Dorsum of thorax largely or entirely pale pubescent 4
   Dorsum of thorax largely black pubescent ..... *rustica* (Say) (p. 300)
4. Apical half of basal abdominal tergum impunctate 5
   Impunctate area of basal tergum occupying only the narrow apical rim ..... *dentiventris* Smith (p. 289)
5. Pleura largely pale ochraceous pubescent; clypeus dull, punctures close and rather fine ..... *bidentis* Cockerell (p. 283)
   Pleura with a limited area of pale pubescence just beneath wing bases, otherwise fuscous ..... *(Heliomelissodes) desponsa* Smith (p. 274)

6(2). Abdominal terga 3 and 4, and usually 2 also, with white, apical fasciae; scopa of simple, or very sparsely plumose, hairs (*Apomelissodes*) 7
   Fasciae on terga 2 and 3, when present, submedian in position, that on 4 usually apical or nearly 9

7. Clypeus shining, median area above sparsely and irregularly punctate ..... *mitchelli* LaBerge (p. 279)
   Clypeus closely punctate throughout .. 8
8. Scopal hairs on hind tibiae entirely simple; punctures of pleura and of propodeum laterally, deep and distinct, although close ..... *fimbriata* Cresson (p. 277)
   Scopal hairs sparsely but distinctly plumose; punctures of pleura and of propodeum laterally, crowded and indistinct .. *apicata* Lovell & Cockerell (p. 276)

9(6). Pubescence, except the scopa, entirely black on head, thorax and legs ..... *bimaculata bimaculata* Lepeletier (p. 267)
   Some pale pubescence on either the head, thorax or legs 10

10. Pubescence of scutum and scutellum entirely pale, or with but a very few inconspicuous dark hairs 11
    Scutum and scutellum with extensive patches of black pubescence 15

11. Pubescence of dorsum of thorax bright fulvous 12
    Thorax with pale ochraceous pubescence dorsally 13

12. Abdominal terga 3-5 with rather short but erect, black hairs basad of the fasciae ... *trinodis* Robertson (p. 304)
    Pubescence of abdominal terga 3-5 largely pale, subappressed ..... *agilis* Cresson (p. 282)

13(11). Mid basitarsi and tibiae entirely pale pubescent 14
    Mid basitarsi with black or piceous hairs on outer surface, mid tibiae dark pubescent at least in part ..... *comptoides* Robertson (p. 271)

14. Abdominal terga 1-3 with short, suberect, black pubescence laterally, basad of the fasciae on 2 and 3 ..... *tepaneca* LaBerge (p. 273)
    Pubescence of terga 1-3 entirely pale ... *menuachus* Cresson (p. 295)

15(10). Pleura black pubescent at least in part 16
    Pleura entirely pale pubescent 18

16. Pleura largely pale pubescent, with but a small amount of black pubescence beneath wing bases ..... *denticulata* Smith (p. 288)
    Pubescence on upper part of pleura ochraceous, becoming fuscous or blackish below 17

17. Posterior two-thirds of scutum conspicuously black pubescent; apical areas of terga 2 and 3 largely impunctate ..... *rustica* (Say) (p. 300)
    Scutum with only a limited area of black pubescence posteriorly; apical areas of terga 2 and 3 distinctly although finely punctate ..... *comptoides* Robertson (p. 271)

18(15). Large and robust; wings infuscated;

scutum coarsely punctate ..... *(Callimelissodes) coloradensis* Cresson (p. 280)
Size moderate; wings hyaline or lightly infuscated; punctures of scutum and scutellum rather fine 19

19. Clypeus with dark pubescence .... *rustica* (Say) (p. 300)
Pubescence of clypeus entirely pale .. 20

20. Mid basitarsi brownish or blackish pubescent 21
Mid basitarsi pale pubescent 25

21. Scutum almost entirely black pubescent, with only a very narrow area of pale hairs along anterior margin .... *illata* Lovell & Cockerell (p. 292)
Scutum with a narrow but distinct band of pale pubescence across anterior margin 22

22. Fasciae on segment 4 entire, uninterrupted on its posterior border .... *boltoniae* Robertson (p. 284)
Fascia on segment 4 interrupted medially on its posterior border, or slightly removed from the rim 23

23. Second abdominal tergum very nearly impunctate .. *denticulata* Smith (p. 288)
Tergum 2 with numerous close, distinct punctures, at least over basal half ..24

24. Apical half of tergum 2, beyond the fascia, nearly or quite impunctate .... *rustica* (Say) (p. 300)
Apical half of tergum 2 minutely but rather closely punctate, the punctures nearly as close as over basal half .... *tincta* LaBerge (p. 303)

25(20). White fascia of tergum 4 subapical and quite narrow, being noticeably removed from rim 26
Fascia on tergum 4 definitely apical in position 27

26. Terga 2 and 3 without evident punctures between the fasciae and apical rims; fascia on 4 separated from rim by a distinct, shining, bare area .... *subillata* LaBerge (p. 301)
Terga 2 and 3 with scattered, minute but distinct punctures between fasciae and and apical margins; fascia on 4 separated from rim by a narrow area of black pubescence .... *pilleata* LaBerge (p. 298)

27(25). Wings lightly but uniformly infuscated; median fasciae of terga 2 and 3 very narrow, white; tergum 4 with conspicuous, erect, black pubescence across basal area of disc ....*communis* Cresson (p. 269)
Wings hyaline or somewhat whitish ...28

28. Basal half of tergum 2 with fine but distinct punctures, even near mid line ..29
Punctures on basal half of tergum 2 medially exceedingly minute and obscure, if at all evident 31

29. Scutellum shining, punctures deep and distinct but well separated, interspaces considerably greater than diameter of punctures .. *fumosa* LaBerge (p. 291)
Scutellum closely punctate throughout 30

30. Punctures of clypeus contiguous throughout; size small (8 mm.); wings whitish ..... *nivea* Robertson (p. 297)
Clypeus shining between slightly separated punctures .... *manipularis* Smith (p. 294)

31(28). Terga 2 and 3 only very obscurely punctate even at each extreme side; vertex with a transverse row of erect black hairs .... *wheeleri* Cockerell (p. 308)
Terga 2 and 3 quite distinctly punctate toward each side; vertex with little if any black pubescence 32

32. Mandibles very short, length only about twice the basal width; scutellum somewhat more rounded, the punctures rather close, considerably finer than those of scutum medially .... *coreopsis* Robertson (p. 286)
Mandibles of ordinary length; scutellum rather flat, punctures similar to those of scutum medially, but much closer .. .. *vernoniae* Robertson (p. 306)

Males

1. Fasciae on abdominal terga 2-5 apical in position, usually complete and conspicuous (*Apomelissodes*) 2
Fasciae either inevident, or those on terga 2-4 more or less median in position .. 4

2. Clypeus entirely or in part black .... *apicata* Lovell & Cockerell (p. 276)
Clypeus entirely yellow 3

3. Abdominal fasciae of elongate, white hairs that overly the depressed, non-pubescent apical margins .... *fimbriata* Cresson (p. 277)
Abdominal fasciae of short, densely plumose hairs covering most of the depressed apical margins .... *mitchelli* LaBerge (p. 279)

4(1). Upper portion of clypeus to some degree black 5
Clypeus entirely yellow 9

5. Pubescence of dorsum of thorax entirely pale ochraceous 6
Scutum and scutellum with a considerable amount of black or fuscous pubescence 7

6. Basal segment of flagellum extremely short, subequal to pedicel .... *dentiventris* Smith (p. 289)
Basal segment of flagellum elongate, equalling about one-third the length of segment 2 .... *(Heliomelissodes) desponsa* Smith (p. 274)

7(5). Vertex with conspicuous, erect, black hairs; apical impressed areas of abdominal terga dark, concolorous with the more basal areas, with a few very short hairs and microscopic punctures ..... *denticulata* Smith (p. 288)
Pubescence of vertex entirely white; impressed areas of terga more coppery .8

8. Basal half of tergum 2 deeply and distinctly punctate, the apical half beyond the fascia invaded to some degree by minute punctures .... *tincta* LaBerge (p. 303)
Punctures on basal half of tergum 2 very minute and sparse near mid-line, becoming more distinct toward each side, the apical half nearly or quite impunctate ..... *subillata* LaBerge (p. 301)

9(4). Pubescence of legs black, at least in part 10
Pubescence of legs entirely pale 12

10. Pubescence of mid and hind tibiae and basitarsi white .... *bimaculata bimaculata* (Lepeletier) (p. 267)
Pubescence of mid and hind tibiae and basitarsi blackish or fuscous 11

11. Thorax entirely black pubescent .... *bimaculata nulla* LaBerge (p. 269)
Thorax, other than legs, covered with pale ochraceous pubescence .... *(Heliomelissodes) desponsa* Smith (p. 274)

12(9). Wings lightly but uniformly infuscated 13
Wings at most faintly yellowish, usually hyaline 15

13. Pubescence of scutum and scutellum entirely pale orchraceous .... *comptoides* Robertson (p. 271)
Scutum and scutellum with considerable fuscous pubescence 14

14. Larger (15 mm.); punctures of abdominal terga deep, distinct and rather coarse and close; broad, median area of tergum 2 not fasciate ..... *(Callimelissodes) coloradensis* Cresson (p. 280)
Smaller; punctures of tergum 2 basally minute and rather sparse, the broad, apical impressed area nearly impunctate; tergum 2 with narrow, oblique, white fasciae on each side .... *communis* Cresson (p. 269)

15(12). Labrum entirely black 16
Labrum yellow, at least in part 22

16. Apical impressed areas of abdominal terga dark, becoming somewhat yellowish along rims 17
Apical impressed areas of terga broadly hyaline 20

17. Dorsum of thorax with bright fulvous pubescence .*trinodis* Robertson (p. 304)
Thoracic pubescence pale ochraceous or whitish 18

18. Scutum closely and deeply punctate throughout, interspaces no greater than diameter of punctures, even posteriorly ..... *dentiventris* Smith (p. 289)
Punctures in median posterior area of scutum quite sparse 19

19. Punctures of abdominal terga 1 and 2 deep, distinct, close, and quite coarse over both basal and apical areas .... *boltoniae* Robertson (p. 284)
Terga 1-3 with minute, rather sparse punctures, apical impressed areas of 2 and 3 impunctate .... *subillata* LaBerge (p. 301)

20. Tergum 5 not angulate laterally; terga 2 and 3 without dark hairs .... *coreopsis* Robertson (p. 286)
Tergum 5 angulately produced at each extreme side; terga 2 and 3 often with some suberect black hairs 21

21. Punctures of abdominal terga relatively close and coarse, interspaces no more than two or three times the diameter of the punctures .... *fumosa* LaBerge (p. 291)
Tergal punctures finer and much more widely separated, especially laterally .. .. *boltoniae* Robertson (p. 284)

22.(15). Apical impressed areas of terga darker, possibly becoming somewhat brownish along rims 23
Abdominal terga broadly hyaline and transparent apically 28

23. Pubescence of dorsum of thorax entirely pale 24
Dorsum of thorax with at least some intermixture of dark hairs 25

24. Dorsum of thorax with bright ochraceous or fulvous pubescence .... *trinodis* Robertson (p. 304)
Pubescence of thorax pale ochraceous to whitish ..... *rustica* (Say) (p. 300)

25(23). Mandibles with basal, yellow maculations 26
Mandibles black, not maculated 27

26. Apical depressed area of tergum 2 extensive, occupying more than half of the median length of plate; pubescence ochraceous ..... *wheeleri* Cockerell (p. 308)
Depressed area of tergum 2 less extensive, occupying much less than half of the median length; pubescence white .. .. *pilleata* LaBerge (p. 298)

27(25). Pubescence of discs of abdominal terga 2-4, basad of the fasciae, entirely pale ..... *subillata* LaBerge (p. 301)
Discs of terga 2-4 with evident, erect dark hairs *illata* Lovell & Cockerell (p. 292)

28(22). At least basal half of mandibles black 29
Mandibles with a distinct basal yellow spot 31

29. Dorsum of thorax with abundant black pubescence .*manipularis* Smith (p. 294)
Dorsum of thorax entirely pale pubescent 30

30. Posterior half of scutum closely and rather uniformly punctate .... *bidentis* Cockerell (p. 283)
Posterior half of scutum shining, nearly impunctate except along margins .... *nivea* Robertson (p. 297)

31(28). Labrum entirely yellow ....*tepaneca* Cresson (p. 273)
Labrum at least narrowly black along the lateral margins 32

32. Basal segment of flagellum very short, its shorter side about equal to pedicel ..... *agilis* Cresson (p. 282)
Shorter side of basal segment of flagellum considerably longer than pedicel 33

33. Apical impressed area of tergum 2 occupying fully half the median length of plate, basal half smooth but dull, punctures very minute, well separated .... *vernoniae* Robertson (p. 306)
Impressed area of tergum 2 occupying less than half the median length of plate, basal area dull, very finely and closely punctate . *menuachus* Cresson (p. 295)

Melissodes (Melissodes) bimaculata bimaculata (Lepeletier)

Macrocera bimaculata Lepeletier, 1825. In Latreille, Encycl. Method. Ins. 10, p. 528. ♀.
Macrocera binotata Say, 1837. Boston Jour. Nat. Hist. 1, p. 404. ♀ ♂.
Macrocera nigra Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 112. ♂.
Melissodes nigra Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 310.
Melissodes bimaculata Cresson, 1879. Amer. Ent. Soc. Trans. 7, p. 225.
Melissodes bimaculata Ashmead, 1894. Psyche 7, p. 25. (biology)
Melissodes bimaculata Banks, 1902. N. Y. Ent. Soc. Jour. 10, p. 209. (biology)
Melissodes melanosoma Cockerell, 1905. Canad. Ent. 37, p. 266.
Melissodes binotata Tucker, 1909. Kans. Acad. Sci. Trans. 22, p. 281.
Melissodes bimaculata Folsom, 1922. Ent. Soc. Amer. Ann. 15, p. 183. (biology)
Melissodes bimaculata Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 34. (biology)
Melissodes bimaculata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Melissodes (Melissodes) bimaculata bimaculata LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1104.

FEMALE—Length 13-15 mm., breadth of abdomen 5-5.5 mm.; black, the mandibles slightly reddened but very dark, with a faint yellowish area toward the apex, segments of flagellum beyond the 2nd brownish-testaceous beneath, black above; apical tarsal segments somewhat brownish, spurs brownish-testaceous; tegulae black, somewhat tinged with brown along outer margin; wings rather uniformly deeply infuscated, veins piceous to black; cheeks much narrower than eyes; clypeus slightly protuberant, its median length approximately half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum slightly less than twice the length of segment 2; punctures of clypeus deep, distinct, rather coarse and close above, becoming fine and densely crowded toward apical margin, those on labrum densely crowded medially, becoming somewhat coarser and rather sparse on each side; face laterally above clypeus closely and rather finely punctate, punctures becoming minute and sparse above where the surface is shining between eyes and ocelli; vertex closely and rather deeply punctate behind ocelli; cheeks shining and very finely punctate beneath rather dense pubescence; scutum shining between deep and distinct punctures, these rather coarse and quite sparse in median area of disc posteriorly, becoming somewhat finer and much closer laterally and anteriorly, those on scutellum finer and more evenly distributed, interspaces nearly equal to diameter of punctures; punctures of pleura coarse, close and deep, interspaces narrow, somewhat shining; posterior face of propodeum rather coarsely, deeply and closely punctate, the dorsal triangle shining below, upper surface somewhat less shining, quite closely and rather deeply punctate along upper margin and toward each side, lateral faces closely and rather finely punctate throughout; basal two-thirds of basal abdominal tergum deeply, distinctly and rather

coarsely and closely punctate, the punctate area nearly reaching apical margin on each extreme side, apical third medially somewhat shining and entirely impunctate; terga 2-4 deeply, distinctly and rather finely punctate, punctures well separated medially on 2 and 3, becoming close at extreme sides, much closer on 4, the broad apical impressed areas well punctured nearly to the rims; tergum 5 densely and very finely rugose beneath the dense pubescence; pygidium rather narrowly triangular, median length barely exceeding the basal width, narrowly rounded at apex; pubescence of head, thorax, and fore and mid legs, largely black, with only a few pale hairs on face around and between antennae; tibial scopa whitish, strongly contrasting with the otherwise black pubescence, the hairs quite densely plumose; abdominal terga 1-3 largely short, black pubescent, although basal tergum with somewhat more copious, erect pubescence anteriorly, sometimes with barely perceptable traces of oblique, white fasciae at extreme sides of 2 and 3; tergum 4 densely white pubescent apically, broadly interrupted medially; and terga 5 and 6 entirely black.

MALE—Length 11-13 mm., breadth of abdomen 4.5 mm.; black, the clypeus and labrum bright yellow, mandibles largely dark, but more or less yellow at base, apex with a rather short testaceous maculation; flagellum beyond segment 1 brownish-testaceous beneath, black above, the basal segment more piceous; apical tarsal segments becoming somewhat brownish-testaceous, spurs pale testaceous; tegulae piceous or black, very narrowly brownish along outer margin; wings rather deeply and uniformly infuscated, veins piceous to black; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum about as long as the apical width, segment 2 about three times longer; punctures of clypeus quite uniformly coarse, close, deep and distinct, those on labrum much finer and closer medially, becoming rather sparse on each side; punctures of face laterally above clypeus quite deep, distinct and rather close and coarse, becoming minute on the shining surface above antennae, rather sparse between eyes and ocelli; vertex closely and rather coarsely punctate medially, becoming rather sparse laterally, distinctly separated on cheeks, rather coarse on hind margin, becoming minute toward eyes; scutum shining between coarse, deep and distinct punctures, these rather widely separated over posterior half, becoming closer and somewhat finer laterally and anteriorly; scutellum with somewhat finer and closer punctures; pleura with coarse, deep and distinct punctures that are rather well separated on central area, but become coarser above and below; posterior face of propodeum deeply, distinctly, and quite sparsely punctate, dorsal face becoming much more closely punctate, especially toward extreme sides, lateral faces closely and distinctly punctate; punctures of abdominal terga 1-3 deep, distinct but rather fine, well separated medially, becoming quite close at each extreme side, apical impressed areas distinctly, deeply and finely punctate nearly to the rims, the punctures somewhat more sparse than basally; terga 4-6 much more closely and finely punctate, the punctures becoming densely crowded laterally; tergum 5 not distinctly angulate laterally, but 6 with a short, triangular, apical spine-like angle on each side; pubescence largely whitish on face, with a few dark hairs at extreme sides, vertex white pubescent in part but a few dark hairs between ocelli, and posterior margin densely fringed with fuscous pubescence, that on cheeks entirely black; scutum with an intermixture of dark and light hairs, those on scutellum more definitely blackish, the pleura and propodeum largely dark pubescent, but with a few pale hairs beneath and on upper part of propodeum posteriorly; legs with dark pubescence on the coxae, trochanters and femora, but tibial and tarsal hairs generally whitish; abdominal terga largely covered with short, suberect, dark pubescence, but with an intermixture of pale hairs on basal tergum anteriorly, and terga 3-5 with narrow fasciae that are widely interrupted medially, somewhat oblique on 3, more nearly subapical on 4, and definitely apical on 5; median length of pygidial plate about equal to basal width, abruptly constricted toward the apex which is rather narrowly truncate; sternum 7 similar to *comptoides* (fig. 81) but apical rolled portion of median plates much smaller; sternum 8 truncate or broadly and shallowly incurved apically; sternum 8 and genital armature as in *comptoides* but gonostyli with hairs at base more elongate.

DISTRIBUTION—Generally distributed throughout the Eastern United States, reaching North Dakota, Colorado and New Mexico in the West, May to October.

FLOWER RECORDS — The following genera are listed by LaBerge (1956): *Abutilon, Agastache, Althaea, Arctium, Asclepias, Asparagus, Aster, Astragulus, Baptisia, Bidens, Blephilia, Brauneria, Cacalia, Campanula, Cassia, Cephalanthus, Cicuta, Cirsium, Convolvulus, Cuphea, Cucurbita, Dalea, Desmodium, Dianthera, Dipsacus, Echinocystis, Eupatorium, Gaura, Gerardia, Gladiolus, Gossypium, Grindelia, Hele-*

nium, Helianthus, Hibiscus, Impatiens, Ipomoea, Jacquemontia, Lepachys, Lespedeza, Lobelia, Lythrum, Malva, Medicago, Melilotus, Mentha, Monarda, Nepeta, Oenothera, Oxalis, Petalostemum, Petunia, Physostegia, Platycodon, Polygonum, Prunella, Pycnanthemum, Ratibida, Rhus, Rudbeckia, Sagittaria, Scrophularia, Scutellaria, Seymeria, Sicyos, Silphium, Siscanna, Solidago, Stachys, Strophostylis, Symphoricarpos, Teucrium, Trifolium, Verbena, Vernonia, Veronica and *Vitex.*

Melissodes (Melissodes) bimaculata nulla LaBerge

Melissodes (Melissodes) bimaculata nulla LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1109.

This South Florida form differs from typical *bimaculata* primarily in the more uniformly black pubescence. In the female the scopa is black or very dark fuscous, and the abdominal terga are entirely black, with no evidence of white fasciae. The wings also are somewhat more deeply infuscated. In the males the pubescence of the face is whitish but the thorax is almost entirely black pubescent and the pubescence of the legs is largely black, possibly somewhat more fuscous on hind tibiae. Also as in the female, the abdomen is entirely lacking in white pubescent fasciae and the wings are somewhat darker.

DISTRIBUTION—South Florida, February to July.

FLOWER RECORD—*Lithrum lineare.*

Melissodes (Melissodes) communis communis Cresson

Melissodes communis Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 204. ♀ ♂.

Melissodes hortivagans Cockerell, 1905. Biol. Soc. Wash. Proc. 18, p. 180. ♂ ♀.

Melissodes Martini Cockerell, 1905. Ann. Mag. Nat. Hist. (7) 15, p. 526. ♀.

Melissodes variabilis Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀ ♂.

Melissodes xanthopteralis Cockerell, 1906. Ann. Mag. Nat. Hist. (7), 17, p. 362. ♂.

Melissodes manni Cockerell, 1924. Amer. Mus. Novitates 113, p. 1. ♂.

Melissodes hortivagans melanotica Cockerell, 1925. Ann. Mag. Nat. Hist. (9) 16, p. 231. ♀.

Melissodes (Melissodes) communis communis LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1053.

FEMALE—Length 11.5-14.5 mm., breadth of abdomen 4-5 mm.; black, the mandibles somewhat reddened apically, segments of flagellum beyond the 2nd brownish-testaceous beneath, black above; apical tarsal segments becoming more brownish-testaceous, spurs pale testaceous; tegulae piceous anteriorly, becoming more testaceous posteriorly and along outer margin; wings lightly infuscated, veins brownish to piceous; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum nearly twice as long as shorter side of segment 2; punctures of clypeus deep, distinct, quite close and rather coarse, becoming somewhat crowded and much finer toward apical rim; labrum very finely and densely punctate medially, becoming less crowded laterally; lateral areas of face above clypeal margin finely and rather closely punctate, the punctures becoming sparse above antennae medially, lateral areas nearly impunctate; vertex finely and closely punctate medially, punctures rather fine and close on cheeks posteriorly, becoming minute and hardly visible toward eyes; scutum shining, punctures quite coarse and deep, sparse in center of disc posteriorly, becoming quite fine and close laterally and anteriorly, fine but evenly distributed and rather close on scutellum; punctures of pleura deep, distinct, rather fine and quite close; posterior face of propodeum rather dull, punctures rather fine and close medially, becoming somewhat more widely separated on each side, dorsal area dull medially, punctures rather fine but distinct and slightly separated, becoming closer laterally, lateral faces quite uniformly, finely, closely and distinctly punctate; basal abdominal tergum dull across basal half, punctures very fine, shallow, rather widely separated, closer at extreme sides where they nearly reach apical margin, the broad median apical area entirely impunctate; terga 2 and 3 very finely and rather closely punctate across base, punctures becoming crowded laterally, impressed apical areas relatively smooth, with only widely scattered, exceedingly minute punctures at all evident; terga 4 and 5 very finely and densely rugose across base, impressed apical area of 4 only very minutely punctate beneath dense tomentum; median length of pygidium about equal to basal width, subtriangular, apex narrowly rounded; pubescence of head largely pale, with a few scattered, erect, fuscous hairs across vertex; scutum and scutellum largely fuscous pubescent, but the narrow anterior margin of scutum, and pleura and propodeum entirely, pale ochraceous pubescent; pubescence of legs largely pale, with some darker hairs on outer

surface of fore and mid tibiae and basitarsi, the hind tibial scopa pale yellowish, scopal hairs sparsely but quite distinctly plumose; basal abdominal tergum with rather copious, erect, pale pubescence anteriorly and at extreme sides, with a few short dark hairs evident toward sides apically; tergum 2 with a rather broad, basal, white fascia that is usually partially covered by tergum 1, and with a narrow, submedian white fascia, intervening area dark, with short, subappressed blackish hairs visible; tergum 3 with a submedian, quite narrow, white fascia, area between this and base more thinly covered with whitish tomentum; apical half of tergum 4 densely white tomentose to the rim, but this slightly interrupted on apical margin medially, basal area largely covered with erect, but rather short, blackish pubescence; apical impressed areas of terga 2 and 3 with rather sparse, short, subappressed, black hairs; terga 5 and 6 entirely covered with blackish pubescence, but the apical fimbria of 5 somewhat more fuscous medially.

MALE—Length 11-13 mm,. breadth of abdomen 3.5-5 mm.; black, the clypeus, labrum and basal half of mandibles bright yellow, mandibles apically becoming piceous; antennal flagellum testaceous beneath, piceous above, basal segment more piceous; tarsal segments of legs becoming testaceous, spurs pale yellow, tegulae largely testaceous; wings lightly infuscated, somewhat paler apically, veins testaceous to brownish; apical margins of abdominal terga becoming somewhat hyaline; cheeks considerably narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; shorter side of basal segment of flagellum only very slightly longer than pedicel, segment 2 about five times as long; punctures of clypeus rather coarse and close but not crowded, rather obscure on the yellow surface, those on labrum somewhat closer, deeper and more distinct; lateral areas of face above clypeus finely and closely punctate, punctures becoming more minute above antennae, surface shining; vertex quite closely punctate behind ocelli; cheeks rather closely and distinctly punctate along posterior margin, becoming shining and nearly impunctate toward eyes; punctures of scutum, scutellum and pleura deep, distinct and quite coarse, rather sparse in center of scutum posteriorly, becoming closer and somewhat finer laterally and anteriorly, rather well separated on scutellum but becoming quite close along anterior and posterior margins, rather well separated on median area of pleura, becoming somewhat closer above and below; posterior face of propodeum rather sparsely punctate, dorsal area becoming much more closely punctate medially and along upper margin, lateral faces somewhat shining between quite deep and distinct but rather fine, irregularly scattered punctures; abdominal terga 1 and 2 with quite deep, distinct and rather fine punctures across base, these rather widely separated, becoming close only at extreme sides, apical impressed areas largely impunctate, invaded only slightly by very minute punctures; terga 3 and 4 much more finely and closely punctate medially, punctures very close at sides of 4, apical impressed areas largely impunctate; tergum 5 very finely and closely punctate across disc, apical impressed area impunctate, with a short, acute, triangular process at each extreme side; tergum 6 densely and finely rugose beneath dense pubescence, with a triangular apical spine on each side; pubescence of head, thorax and legs largely pale ochraceous, scutum with a few dark hairs in center of disc posteriorly, and scutellum with more abundant, erect, somewhat darker pubescence; basal abdominal tergum with rather copious, erect, pale hair basally and laterally, otherwise largely bare; tergum 2 with a pair of somewhat oblique, very narrow, white fasciae that are widely separated medially, basal area of disc covered with short, suberect, blackish pubescence, becoming white at extreme sides; terga 3 and 4 with submedian, white fasciae that are very thin or interrupted medially, 4 with largely pale, suberect hairs across base, 5 with more elongate, fuscous pubescence or hairs, with some elongate whitish hairs at extreme sides; tergum 6 largely fuscous pubescent; median length of pygidial plate about equal to basal width, margins carinate, nearly parallel to the abruptly constricted apical area, apex subtruncate or very broadly rounded; sternum 7 much as in *comptoides* (fig. 81) but apical rolled portion much smaller; sternum 8 broadly truncate or incurved at apex; genital armature as in *comptoides*, but gonostyli with hairs at base more elongate.

DISTRIBUTION—Mexico to Wyoming and North Dakota, east to the New England states and Florida, March to September.

FLOWER RECORDS—Host plant records according to LaBerge (1956) include the following plant genera: *Abutilon, Althaea, Amorpha, Asclepias, Baptisia, Befaria, Blephilia, Brazoria, Campanula, Cassia, Chrysopsis, Cirsium, Cleome, Convolvulus, Croton, Cucurbita, Cyrilla, Dalea, Dianthera, Euchium, Gossypium, Grindelia, Helenium, Helianthus, Heliotropum, Hyrtia, Ipomoea, Lactuca, Lythrum, Malva, Medicago, Melilotus, Mentha, Monarda, Nepeta, Oenothera, Opuntia, Passiflora, Petaloste-*

mum, Phaseolus, Platycodon, Prionopsis, Proboscidea, Pycnanthemum, Ratibida, Rudbeckia, Rhus, Salvia, Sidalcea, Solanum, Solidago, Teucrium, Thelesperma, Verbena and *Vernonia.*

Melissodes (Melissodes) comptoides Robertson

Melissodes comptoides Robertson, 1898. Acad. Sci. St. Louis, Trans. 8, p. 52. ♀ ♂.
Melissodes martini hitei Cockerell, 1908. Ann. Mag. Nat. Hist. (8) 2, p. 33.
Melissodes (Melissodes) comptoides LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1087.

FEMALE—Length 12.5-13 mm., breadth of abdomen 5-5.5 mm.; black, mandibles with a subapical testaceous maculations; segments of flagellum beyond 2nd brownish-testaceous beneath, black above; apical tarsal segments becoming brownish-testaceous, spurs testaceous, tegulae rather dark anteriorly, becoming reddish-testaceous posteriorly, margin more yellowish; wings lightly infuscated, veins piceous; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; basal sgment of flagellum about twice the length of segment 2 on its shorter side, this about equal to apical width; clypeus rather dull, punctures quite coarse, deep and close, becoming narrowly finer and densely crowded toward apical margin, labrum with dense fine punctures along mid-line, these becoming more distinctly and widely separated laterally; lateral areas of face above clypeus closely, finely and quite deeply punctate, median area between antennae much more sparsely punctate, punctures becoming somewhat more sparse above; vertex very closely and finely punctate behind ocelli; cheeks with close, fine, deep and distinct punctures posteriorly, these becoming minute and obscure along margin of eye; punctures of scutum and mesopleura deep, distinct and quite coarse, slightly separated on scutum medially, becoming somewhat finer and much closer laterally, anteriorly and posteriorly, pleural punctures rather evenly distributed and quite close; punctures of scutellum much finer and closer, almost crowded; posterior face of propodeum dull, punctures quite deep and distinct, irregularly scattered, dorsal area much more closely, deeply and regularly punctate, lateral faces finely, closely and deeply punctate throughout; basal abdominal tergum largely covered with fine, deep, distinct, slightly separated punctures, only the apical third or fourth impunctate, the punctate area nearly reaching apical margin laterally; tergum 2 with deep, distinct, rather fine and slightly separated punctures across basal area, these invading the apical impressed areas, but punctures finer and somewhat more widely separated, only the very narrow apical rim impunctate; terga 3 and 4 quite deeply, closely and rather finely punctate across base, punctures invading apical impressed areas where they are somewhat more sparse, apical rim of 3 narrowly impunctate; pygidium subtriangular, with narrowly rounded apex; pubescence rather short but largely pale on face, with some elongate black hairs between antennae and eyes, a row of black hairs across vertex, and a few elongate, black hairs around margin of clypeus; pubescence of cheeks whitish; scutum, scutellum and pleura above chiefly pale ochraceous pubescent, scutum posteriorly with a very few dark, erect hairs and a small amount of dark pubescence on scutellum; mesopleura with an intermixture of dark and light hairs on outer surface becoming black or fuscous pubescent beneath; propodeum entirely pale ochraceous pubescent; pubescence of legs largely dark, the fore and mid tibiae with a fuscous patch on outer surface toward apex, scopa entirely pale yellow, scopal hairs densely plumose; basal abdominal tergum with rather copious, erect, pale ochraceous pubescence basally, disc apically with some short but definite black pubescence on each extreme side, median area bare; tergum 2 with a basal, pale ochraceous fascia which is usually largely covered by tergum 1, and with a narrow, submedian, whitish fascia that is usually broadly interrupted medially, intermediate area between these fasciae with extremely short, suberect, black pubescence; tergum 3 with a submedian white fascia, with some thin white pubescence and scattered, erect black hairs toward basal margin; tergum 4 with a broad, dense, white fascia which is completely apical on each side, but median area rather broadly interrupted on apical margin, basal area of disc with erect, rather coarse and elongate black hairs which tend to overlie the white fascia; terga 5 and 6 entirely blackish or fuscous pubescent.

MALE—Length 10-13 mm., breadth of abdomen 3.5-5 mm.; black, the clypeus, labrum and base and apex of mandibles yellow; segments of flagellum beyond the 1st brownish-testaceous beneath, more piceous above, and basal segment piceous; apical tarsal segments becoming testaceous, spurs pale yellowish, tegulae brownish-testaceous, becoming somewhat more yellowish posteriorly; wings quite uniformly lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga narrowly yellowish; cheeks much narrower than eyes; clypeus very slightly protuberant, its median length slightly greater than distance between eyes below; eyes rather strongly

convergent below; shorter side of basal segment of flagellum no longer than pedicel, much shorter than apical width, segment 2 at least six times longer; clypeus with rather fine, well separated but quite distinct punctures, those on labrum much finer and closer medially, becoming rather sparse at each extreme side; lateral areas of face above clypeus closely, finely and rather deeply punctate, supraclypeal area very sparsely so, punctures becoming more minute and indistinct above, surface shining; vertex quite closely and deeply punctate behind ocelli, and cheeks shining, with rather coarse and close punctures posteriorly, these becoming minute and obscure toward margin of eye; punctures of scutum, scutellum and pleura coarse, deep and distinct, rather well separated on scutum medially, becoming closer anteriorly and posteriorly, quite close over most of scutellum, rather uniformly slightly separated on pleura; posterior face of propodeum quite deeply, distinctly and coarsely punctate, punctures rather sparse on each side, otherwise close, dorsal area quite closely punctate medially, becoming more rugoso-punctate laterally, lateral faces shining between numerous, rather close, fine and shallow punctures; abdominal terga 1 and 2 with rather coarse, deep and distinct punctures basally, rather widely separated medially on 1, somewhat closer on 2, becoming minute and indistinct toward apical margin of 1, and invading the broad, impressed, apical area of 2 where the punctures are very sparse and minute; discs of terga 3 and 4 finely and closely punctate, punctures becoming densely crowded toward each side, apical impressed areas invaded only slightly by minute punctures; terga 5 and 6 very finely and densely rugoso-punctate; tergum 5 not noticeably angulate at each side, but tergum 6 with a triangular, robust, apical spine at each extreme side; pubescence entirely pale ochraceous on head, thorax and legs; basal abdominal tergum with copious ochraceous pubescence anteriorly, and somewhat shorter, suberect, fuscous or black pubescence posteriorly; tergum 2 with a broad, dense, basal, white fascia which is usually covered by apical margin of tergum 1, and with traces of oblique, narrow, whitish fasciae on each side, widely interrupted medially, disc otherwise covered with very short, suberect, blackish or fuscous pubescence nearly to the rim; tergum 3 with a submedian, white fascia which is slightly interrupted medially, and with some obscure white tomentum between this and base on each side, and tergum 4 with a subapical, dense, white fascia which is narrowed medially exposing the impunctate, shining, apical margin of the plate, basal areas of both 3 and 4 covered with suberect rather long dark hairs,

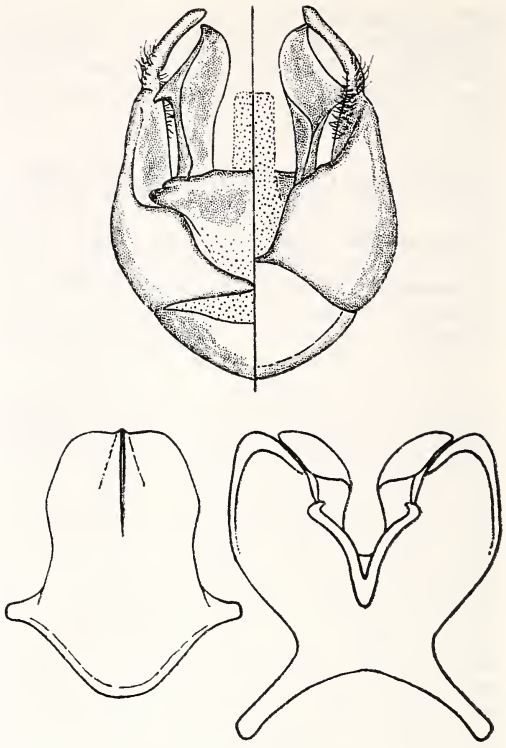


Figure 81
Dorsal (D) and ventral (V) aspects of genital armature, and sterna 7 and 8 in male of *Melissodes comptoides.*

and with some similar dark hairs beyond the fascia on 3; terga 5 and 6 entirely blackish pubescent; median length of pygidial plate about equal to basal width, margin strongly carinate, abruptly constricted toward apex which is broadly rounded or subtruncate; sterna 7 and 8 and genital armature as shown (fig. 81).

DISTRIBUTION — Arizona, Colorado and South Dakota, east to New Jersey and Florida, April to October.

FLOWER RECORDS — LaBerge (1956) lists the following: *Amphiachyris, Asclepias, Aster, Blephilia, Campanula, Cassia, Cleome, Cicuta, Cirsium, Diodea, Euphorbia, Gossypium, Helenium, Helianthus, Lepachys, Lespedeza, Ludwegia, Lycopus, Lythrum, Medicago, Melilotus, Monarda, Petalostemum, Prunella, Pycnanthemum, Ratibida, Solidago, Symphoricarpos, Taraxacum, Teucrium, Verbena, Vernonia* and *Veronica.*

Melissodes (Melissodes) tepaneca Cresson

(Fig. 82)

Melissodes tepaneca Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 211. ♀ ♂.
Melissodes petalostemonis Robertson, 1909. Acad. Sci. St. Louis, Trans. 10, p. 53. ♀.
Melissodes galvestonensis Cockerell, 1905. Biol. Soc. Wash. Proc. 18, p. 181.
Melissodes bruesi Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 110.
Melissodes loena Cockerell, 1909. Entomologist 42, p. 148.
Melissodes masuca Cockerell, 1909. Entomologist 42, p. 148.
Melissodes tepaneca aschenborniana Cockerell, 1912. Ann. Mag. Nat. Hist. (8) 10, p. 28.
Melissodes masuca Cockerell, 1917. N. Y. Ent. Soc. Jour. 25, p. 191.
Melissodes petalostemonis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Melissodes aurescens Cockerell, 1949. U. S. Natl. Mus. Proc. 98, p. 462.
Melissodes tepaneca panamensis Michener, 1954. Amer. Mus. Nat. Hist. 104, p. 132.
Melissodes (Melissodes) tepaneca LaBerge, 1956. Univ. Kans. Sci. Bul. 37, p. 1130.

FEMALE—Length 12-13 mm., breadth of abdomen 4.5 mm.; black, the mandibles more reddish, with an obscure faint yellow area apically; segments of flagellum beyond the 2nd testaceous beneath, piceous above, basal segments darker brownish; apical tarsal segments and entire hind tibiae and tarsi brownish-testaceous, spurs pale yellow, tegulae yellowish-hyaline; wings pale yellowish-hyaline, veins testaceous to brownish; abdominal terga becoming narrowly yellowish-hyaline apically; cheeks considerably narrower than eyes; clypeus very slightly protuberant, its median length slightly less than half the distance between eyes below; eyes very slightly convergent below; shorter side of segment 2 of flagellum about equal to breadth, about half the length of segment 1; punctures of clypeus rather coarse but shallow, slightly separated, becoming fine and densely crowded along apical margin, those on labrum very fine and densely crowded medially, becoming rather sparse laterally; lateral areas of face above clypeus finely, closely and rather shallowly punctate, the supraclypeal area very sparsely punctate, punctures becoming very sparse on each side above antennae where the surface is shining, but close and fine medially below ocelli, vertex closely and finely punctate behind ocelli; cheeks shining, with fine, slightly separated punctures posteriorly, these becoming minute and indefinite toward eye margin; scutum shining between rather deep, moderately coarse punctures, these well separated over posterior half of disc, becoming closer laterally and anteriorly, those on scutellum somewhat finer and quite close; pleura somewhat shining between quite deep, distinct and rather coarse punctures, these well separated in general but becoming closer above beneath wing bases; posterior face of propodeum dull, punctures rather close but not very coarse, dorsal area quite coarsely but shallowly and closely punctate, lateral faces dull and tessellate between fine and very shallow punctures beneath dense pubescence; basal abdominal tergum quite closely and deeply punctate across base, punctures nearly reaching apical margin at each side, becoming more sparse apically, the broad median area impunctate; tergum 2 with deep, distinct, fine and well separated punctures across basal half, apical half with scattered, exceedingly minute, barely visible punctures; basal area of tergum 3 much more closely punctate, 5 and 6 very densely and finely rugoso-punctate, punctures of apical areas of 4 and 5 very fine but definite and distinct; pygidium triangular, with narrowly rounded apex; pubescence of head almost entirely pale ochraceous, with only a few dark hairs on vertex between ocelli, and thorax densely pale ochraceous pubescent, largely obscuring surface of scutum and scutellum, long and copious elsewhere; pubescence of legs largely pale, but front coxae with a few dark hairs, and front basitarsi with some dark hairs anteriorly, mid tibiae with more brownish pubescence on outer surface, the hind tibial scopa pale yellowish, hairs distinctly plumose; basal abdominal tergum with rather abundant, pale ochraceous pubescence across base, apical portion of disc with some suberect, dark pubescence visible toward each side; terga 2 and 3 with whitish, basal fasciae that are usually covered by the preceding tergal plate, and a narrow, median, whitish fascia separated from basal fascia by an area of suberect fuscous pubescence, and with some blackish pubescence across the apical impressed areas; tergum 4 with some blackish, suberect pubescence across base, but the broad apical area densely covered with whitish tomentum which is slightly interrupted on apical margin medially; terga 5 and 6 largely blackish or fuscous pubescent, with some pale hairs on 5 laterally.

MALE—Length 9.5-11 mm., breadth of abdomen 3.5 mm.; black, the clypeus, labrum and base of mandibles bright yellow, mandibles with a testaceous apical maculation; antennal flagellum pale testaceous beneath, piceous above; apical tarsal segments becoming testaceous, tibiae more or less infused with testaceous apically, spurs pale yellow, tegulae testaceous or yellowish-hyaline; wings faintly

yellowish, veins pale testaceous to brownish; apical margins of abdominal terga broadly yellowish-hyaline; cheeks little more than half as broad as eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes quite strongly convergent below; basal segment of flagellum about equal to pedicel in length, segment 2 fully six times this length; punctures of clypeus rather shallow and obscure, well separated above medially, becoming rather close at each extreme side, close and fine on apical margin, those on labrum fine and close medially, becoming quite sparse laterally; lateral areas of face above clypeus quite closely and rather finely punctate, supraclypeal area impunctate medially, face becoming finely and densely punctate on each side, surface above antennae becoming minutely and more sparsely punctate between eyes and ocelli, surface shining, median area quite coarsely and closely punctate; punctures of vertex close and rather fine behind ocelli, cheeks shining, with rather fine and close punctures posteriorly, these becoming very minute and sparse toward eye margin; scutum shining, punctures quite deep and distinct, rather coarse and widely separated medially over posterior half, becoming much closer laterally and anteriorly, somewhat finer and rather sparse on scutellum, and pleura shining between deep, distinct and rather sparse punctures; posterior face of propodeum rather dull, punctures quite coarse, deep and close, dorsal area rather coarsely, closely and shallowly punctate, lateral areas more shining, punctures somewhat finer and quite close throughout; discs of abdominal terga with quite deep, distinct, well separated punctures medially, the punctures becoming slightly closer laterally and coarser across base, finer and more sparse toward the largely impunctate, impressed, apical areas, those on 4 and 5 very close across the base, crowded on 6; tergum 5 only obscurely angulate at each extreme side, and 6 with a rather short, slender, apical spine at each side; pubescence entirely pale yellowish on head, thorax and legs; basal abdominal tergum largely covered with pale ochraceous pubescence, but with some obscure, suberect, dark pubescence across apical third; tergum 2 with a rather broad, basal, pale tomentose fascia which is covered in part by the preceding plate, and with a narrow submedian pale fascia, these separated by an area of suberect blackish hairs, and apical impressed area with similar dark hairs; terga 3 and 4 with submedian, pale ochraceous fasciae, the basal pubescence suberect but entirely pale, apical areas with more elongate, suberect hairs; tergum 5 with a subapical fascia and with some elongate dark hairs across base; tergum 6 apparently entirely dark pubescent;

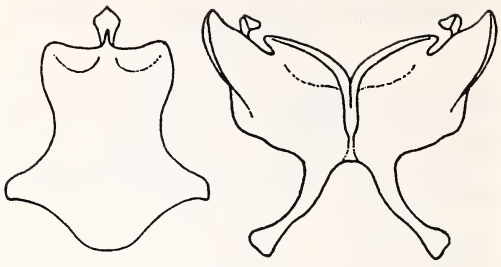


Figure 82
Sterna 7 and 8 in male of *Melissodes tepaneca*.

median length of pygidial plate about equal to basal width, slightly narrowed apically, with a narrow but deep subapical constriction on each side, apex subtruncate or broadly rounded; sterna 7 and 8 as shown (fig. 82); genital armature resembling *comptoides* (Fig. 81), but gonostyli very short, without evident setae.

DISTRIBUTION — Central America, north and east to Kansas, Illinois, North Carolina and Florida, March to November in the United States.

FLOWER RECORDS — LaBerge (1956) lists the following genera as host plants in the United States: *Abutilon, Agastache, Asclepias, Aster, Baccharis, Borrichia, Brazoria, Callirrhoe, Cephalanthus, Cercidium, Coreopsis, Dalea, Eryngium, Gaillardia, Gossypium, Grindelia, Helenium, Lactuca, Lindheimeria, Lythrum, Marrubium, Medicago, Monarda, Opuntia, Parkinsonia, Petalostemon, Phacelia, Phlox, Prosopis, Ratibida, Rubus, Rudbeckia, Salvia, Sisyrinchium, Teucrium, Verbesina* and *Verbena*.

Melissodes (Heliomelissodes) desponsa Smith

(Fig. 84)

Melissodes desponsa Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 310. ♀.
Melissodes nigripes Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 311. ♂. (not ♀)
Melissodes daponsa Bridwell, 1899. Kans. Acad. Sci. Trans. 16, p. 211.
Melissodes cnici Robertson, 1901. Canad. Ent. 33, p. 230. ♀ ♂.
Melissodes (Heliomelissodes) desponsa LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 562.

FEMALE—Length 12-13.5 mm., breadth of abdomen 5-5.5 mm.; black, including labrum and base of mandibles, the latter with an apical testaceous maculation; flagellum beyond segment 2 brownish-testaceous beneath, black

above; apical tarsal segments becoming somewhat brownish, spurs testaceous, tegulae piceous; wings uniformly very lightly infuscated, veins brownish to piceous; cheeks nearly as broad as eyes; clypeus rather strongly protuberant, its median length slightly less than half distance between eyes below; eyes subparallel; basal segment of flagellum twice the length of shorter side of segment 2, which is about equal to the apical breadth; clypeus quite uniformly, deeply, distinctly, closely and rather coarsely punctate; punctures of labrum similar, but somewhat more crowded medially; face below antennae rather finely and closely punctate, becoming smooth and shining, with exceedingly minute and barely evident punctures above antennae, median area rather dull, with fine and rather vague punctures; vertex laterally with some rather distinct and close punctures; cheeks shining, posterior punctures distinct and close, becoming very minute along eye margin; scutum and scutellum somewhat shining between deep, distinct and rather coarse punctures, these slightly separated on disc of scutum posteriorly, becoming finer and densely crowded over anterior half, distinct and slightly separated on scutellum, rather shallow and quite close over mesopleura; posterior face of propodeum dull, punctures rather shallow, irregularly scattered, dorsal area dull, impunctate in mid-line but becoming rather coarsely reticulate laterally, lateral faces becoming somewhat shining anteriorly but otherwise very closely and finely punctate; basal abdominal tergum finely but rather deeply punctate across basal third, punctures rather sparse medially, closer laterally, the broad apical area entirely impunctate; tergum 2 very minutely and sparsely punctate medially, punctures becoming somewhat more distinct and close at each side basally, apical area practically impunctate; tergum 3 very finely and quite closely punctate across basal half, punctures invading apical area nearly to the rim but becoming very minute apically; tergum 4 even more closely punctate across base, becoming more rugose toward the sides basally, the depressed apical half very finely and closely punctate, the narrow apical rim impunctate; tergum 5 dull, with dense, minute punctures; median length of pygidium much greater than basal width, evenly narrowed apically to the narrowly rounded apex, with a slightly elevated median ridge apically; head with pale ochraceous pubescence around and above antennae and across vertex back of ocelli, the cheeks, clypeus, labrum and posterior margin of vertex with black pubescence, mandibles fringed beneath with very long, black or fuscous hairs; scutum with some short, rather inconspicuous black hairs posteriorly, and scutellum with a considerable area of black pubescence, otherwise dorsum of thorax pale ochraceous pubescent, this extending across upper part of pleura and on posterior face of propodeum, the pleura laterally and below, and lateral faces of propodeum, black pubescent; legs largely black or fuscous pubescent, but scopa pale yellowish, hairs sparsely plumose; abdominal terga largely bare, but basal tergum with some rather short pale pubescence anteriorly, the more apical terga with short fuscous pubescence and scattered, elongate, suberect black hairs, entirely lacking pale fasciae.

MALE—Length 11-13.5 mm., breadth of abdomen 4-5 mm.; black, the clypeus yellow, with upper margin sometimes narrowly invaded with black; labrum and mandibles black, mandibles with orange maculae on outer surface near apex; 2nd and following segments of flagellum testaceous beneath, piceous above, the basal segment, pedicel and scape piceous to black; apical tarsal segments somewhat more brownish, spurs dark brownish to testaceous; tegulae blackish; wings very lightly and uniformly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus rather strongly protuberant, median length slightly greater than half the distance between eyes below; eyes very slightly convergent below; shorter side of basal segment of flagellum nearly twice as long as pedicel, segment 2 about two and one half times length of 1; punctures of clypeus and labrum quite deep, distinct, rather close and coarse, those on face on each side below antennae somewhat finer and very close, becoming somewhat more sparse above, surface somewhat more shining, well separated on each side of vertex between eyes and ocelli, but very fine and densely crowded medially, rather close along cheeks posteriorly but becoming minute and widely separated toward margin of eye; punctures quite deep, distinct and rather coarse on scutum and scutellum, slightly separated on scutellum and on scutum posteriorly, becoming finer and densely crowded laterally and anteriorly; punctures quite coarse and close on pleura laterally, becoming finer and closer below, sometimes with a shining, impunctate space just beneath wing base; posterior face of propodeum quite dull, tessellate, punctures irregularly scattered, rather shallow but coarse, dorsal area with a few rather coarse punctures along mid-line, becoming rather coarsely reticulate toward each side, lateral faces becoming somewhat smooth and shining anteriorly and below, punctures becoming obsolescent; punctures of abdominal terga quite deep and distinct, rather coarse, well separated on basal tergum, becoming closer laterally, apical area somewhat invaded by very minute punctures, these becoming close laterally, the margin becoming impunctate; punctures of terga 2 and

3 very fine and well separated toward each side, apical impressed area quite broad, invaded nearly to the rim with very minute, rather close, barely distinguishable punctures; terga 4 and 5 very finely and much more closely punctate, the depressed margins invaded by minute, rather close punctures nearly to the rims; tergum 5 with a slight angle at each extreme side, and tergum 6 with a corresponding, triangular spine-like projection; face with some pale ochraceous pubescence around and between antennae and across vertex, some erect fuscous hairs on each side of clypeus and across posterior margin of vertex; cheeks entirely black pubescent; scutum, scutellum, propodeum and upper part of pleura entirely pale ochraceous pubescent, pleura black pubescent below, and legs with largely black hairs, somewhat paler on inner surface of hind tibiae; basal abdominal tergum with rather copious, erect and elongate, pale ochraceous pubescence across basal half, but with some fuscous pubescence on anterior face near base and some short blackish pubescence on each extreme side apically; pubescence of discs otherwise largely black, suberect, rather thin, short medially, becoming more evident laterally and more elongate on the more apical terga, with no fasciae evident; median length of pygidial plate subequal to basal width, slightly narrowed apically to the abruptly truncate apex, with a slight emargination on each side toward apex; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION — North Dakota to Nova Scotia, South to Oklahoma, Alabama and North Carolina, June to October.

FLOWER RECORDS — *Aster, Braunneria, Carduus, Cassia, Centaurea, Cirsium, Coreopsis, Helianthus, Inula, Monarda, Pontederia, Pycnanthemum, Rudbeckia, Silphium, Solidago* and *Verbena.*

Melissodes (Apomelissodes) apicata Lovell and Cockerell

(Fig. 83)

Melissodes apicata Lovell and Cockerell, 1906. Psyche 13, p. 111. ♀.

Melissodes (Apomelissodes) apicata LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 551.

FEMALE—Length 11.5-12 mm., breadth of abdomen 4.5-5 mm.; black, including clypeus and labrum entirely, and mandibles and legs in large part, mandibles with an apical yellowish spot, apical tarsal segments somewhat more brownish; segments of flagellum beyond the 2nd brownish beneath, black above; tegulae piceous; wings subhyaline at base, becoming very lightly infuscated apically, veins brownish to piceous; apical rims of abdominal terga very narrowly yellowish-hyaline; cheeks considerably narrower than eyes; clypeus rather strongly protuberant, its median length approximately half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum about twice as long as shorter side of segment 2 which is slightly broader than long; clypeus rather coarsely, striately punctate, labrum much more finely and densely so; lateral areas of face below antennae quite closely and coarsely punctate, median area above antennae closely and deeply punctate, lateral areas rather smooth and entirely impunctate; vertex with fine, very close punctures medially, becoming somewhat more separated laterally, cheeks with well separated punctures, rather coarse along hind margin, becoming very fine along eye margin; scutum and scutellum shining, punctures deep and distinct, coarse and well separated on scutum medially, becoming fine and close laterally and anteriorly, those on scutellum somewhat finer, uniformly close; mesopleura less shining, punctures quite coarse but rather shallow, subcontiguous; propodeum posteriorly with rather coarse scattered punctures, dorsal area impunctate along mid-line, becoming quite closely and shallowly punctate laterally, lateral faces somewhat more finely and closely punctate, becoming smooth but dull below and anteriorly; basal abdominal tergum somewhat shining, punctures fine and rather vague, irregularly scattered and sparse, apical third entirely impunctate; discs of terga 2 and 3 with fine but quite distinct, well separated punctures, these becoming somewhat closer at extreme sides, those on 4 and 5 much closer; median length of pygidium somewhat greater than basal width, elongate triangular, apex narrowly rounded; pubescence of head largely white, but with a fringe of black hairs across vertex, and a few black hairs around antennae; scutum and scutellum largely black pubescent, but scutum with a band of white pubescence anteriorly, this continuing very narrowly along lateral margins to the propodeum; tubercles with elongate black hairs, thorax otherwise whitish pubescent; legs largely white pubescent, but fore and mid tibiae with a fuscous patch on outer surface; scopa creamy white, hairs short plumose; basal abdominal tergum with rather copious, erect, whitish pubescence anteriorly and laterally; terga 2-4 with rather broad and very dense, completely apical, white fasciae, this more or less interrupted on 2; discs of terga 2-5 with black pubescence, this very short on 2 and 3 basally, becoming more elongate apically and overlying the fascia to some degree on 3 and 4; tergum 5 with a very dense fimbria of elongate black hairs apically; tergum 6 black pubescent on each side of pygidium.

MALE—Length 9.5-12 mm., breadth of abdomen 3.5-5 mm.; black, including labrum and mandibles, clypeus yellow, with apical margin narrowly black and upper and lateral margins more or less invaded with black; antennal flagellum brownish-testaceous toward the base, becoming more piceous apically, and piceous above; apical tarsal segments somewhat more brownish, spurs pale testaceous; tegulae piceous to black; wings lightly infuscated, veins brownish to piceous; apical rims of abdominal terga very narrowly yellowish-hyaline; cheeks nearly equal to eyes in width, the clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes slightly convergent below; shorter side of basal segment of flagellum only slightly longer than pedicel, segment 2 about five times this length; punctures of clypeus close and rather coarse, somewhat more vague on maculated area, finer and closer on labrum medially, becoming somewhat separated laterally; punctures of face quite coarse and close, becoming very fine and well separated above, between eyes and ocelli, where surface is shining, close and rather fine on vertex medially becoming somewhat coarser and more distinctly separated laterally, quite coarse, distinct and well separated on cheeks, becoming fine and close along margin of eye; scutum and scutellum shining, punctures deep, distinct and quite coarse, well separated medially on scutum, becoming somewhat finer and closer laterally and anteriorly, somewhat finer on scutellum, but evenly distributed and slightly separated; mesopleura rather dull, punctures quite coarse but shallow and close; posterior face of propodeum with rather coarse, shallow, scattered punctures, surface somewhat shining, dorsal area narrowly impunctate along mid-line, becoming shallowly rugose or reticulate laterally, lateral faces more finely and closely punctate, the punctures becoming obsolescent below and anteriorly; basal abdominal tergum largely covered with deep, distinct, rather fine, well separated punctures medially, these becoming closer laterally, fine and well separated toward apical rim; discs of terga 2-5 with very fine, rather deep and distinct, slightly separated punctures, these becoming somewhat more minute beneath the dense fasciae; tergum 5 not angulate laterally; tergum 6 with a distinct, triangular, apical spine at each extreme side; pubescence of head largely pale ochraceous, but with a quite dense fringe of black hairs across vertex; scutum and scutellum largely fuscous pubescent, anterior third of scutum with pale ochraceous pubescence which extends narrowly along lateral margins to the propodeum, thorax and legs otherwise pale ochraceous pubescent; basal abdominal tergum with copious, elongate, pale ochraceous pubescence anteriorly, but with apical third more or less covered with shorter, suberect, black pubescence; terga 2-5 with rather broad, dense, completely apical, white fasciae, completely hiding apical margins, discs with copious but rather short, erect, black pubescence, some black hairs overlying the white fasciae apically, pubescence of tergum 6 entirely black; basal half of pygidial plate somewhat rounded and elevated, with subcarinate margins and a low median ridge that projects apically, the apical part somewhat depressed, subtruncate, margin very slightly outcurved; sternum 7 as shown (fig. 83); sternum 8 similar to *fimbriata* but more broadly rounded apically; genital armature as in *fimbriata*.

DISTRIBUTION — Maine to Florida, through the Atlantic coast states, March to July.

FLOWER RECORDS — Females visit *Pontederia*, but males have been collected also on *Hydrocotyle*, *Melilotus* and *Stachys*.

Melissodes (Apomelissodes) fimbriata Cresson

(Fig. 83)

Melissodes fimbriata Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 203. ♀ ♂.
Melissodes perplexa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 206. (♂ misident)
Melissodes (Apomelissodes) fimbriata LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 545.

FEMALE—Length 11-12 mm., breadth of abdomen 4 mm.; black, the mandibles pale yellowish apically; segments of flagellum beyond the 2nd brownish-piceous beneath, black above; apical tarsal segments brownish-testaceous, and spurs pale yellowish; tegulae black, strongly narrowed anteriorly; wings subhyaline basally, becoming lightly infuscated apically, veins brownish to piceous; cheeks subequal to eyes in width, clypeus only slightly protuberant, its median length slightly greater than distance between eyes below; eyes very slightly convergent below; basal segment of flagellum about one and one half times segment 2, which is somewhat longer than broad; punctures of clypeus quite coarse and very close, becoming finer and densely crowded apically, the labrum more shallowly rugosopunctate; face laterally with fine and close punctures, these becoming rather sparse above where surface is shining, somewhat coarser medially, fine and close on vertex back of ocelli, becoming more widely separated laterally and on cheeks; scutum and scutellum shining, punctures deep and distinct, rather coarse and well separated on scutum medially, becoming close and somewhat finer laterally and anteri-

orly, evenly distributed on scutellum; mesopleura rather coarsely, closely and shallowly punctate; posterior face of propodeum quite coarsely but shallowly punctate, becoming rather sparsely so above, dorsal area impunctate along mid-line, becoming dull and densely rugoso-punctate laterally, lateral faces quite uniformly closely punctate throughout; anterior half of basal abdominal tergum rather dull, punctures shallow but rather coarse and well separated medially, becoming closer and finer laterally, disc rather broadly impunctate across apical third; terga 2 and 3 more finely, deeply and distinctly punctate, well separated medially, becoming quite close at extreme sides and quite close over most of tergum 4; tergum 5 densely and rather finely rugoso-punctate; pygidium quite narrow and elongate, nearly parallel-sided, with a narrowly rounded apex; pubescence whitish in general on head, with a few dark hairs across vertex; scutum and scutellum with copious, erect, fuscous pubescence, scutum narrowly pale pubescent across anterior margin, and the entire pleura propodeum and legs pale pubescent; tibial scopa pale ochraceous, hairs slender, elongate and simple, without evident plumosities; basal abdominal tergum with rather copious, elongate, pale pubescence across base and along lateral margins; tergum 2 with a basal fringe of rather loose, whitish, plumose hairs, usually covered by the apical part of tergum 1; terga 2-4 with whitish, subapical fasciae that occupy the rather narrow, apical, impressed areas, disc of tergum 2 with very short, thin, whitish hairs and a few dark hairs at each extreme side, 3 and 4 with somewhat more conspicuous and erect blackish pubescence which overlies in part the apical fascia; tergum 5 largely fuscous or blackish pubescence this becoming pale to some degree at each extreme side, forming a dense apical fimbria.

MALE—Length 9-10.5 mm., breadth of abdomen 3.5-4 mm.; black, clypeus bright yellow, labrum and mandibles entirely black, flagella brownish-testaceous beneath, more piceous above, apical tarsal segments somewhat more piceous, and spurs brownish-testaceous; tegulae black, strongly narrowed anteriorly; wings very faintly infuscated basally, becoming somewhat more deeply so apically, veins brownish to piceous; apical margins of terga 2-5 obscurely yellowish-hyaline; cheeks considerably narrower than eyes, clypeus somewhat protuberant, its median length considerably greater than half the distance between eyes below; eyes somewhat convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 about five times as long; punctures of clypeus rather fine and close, somewhat deeper and more distinct on labrum; face laterally rather dull and finely punctate below antennae, punctures becoming somewhat more sparse above, close, deep and distinct on vertex medially, more widely separated laterally and on cheeks; scutum and scutellum shining, punctures deep, distinct and rather coarse, well separated on scutum medially; pleura quite dull, somewhat more shining anteriorly; punctures shallow but quite coarse and close; posterior face of propodeum somewhat shining, punctures rather shallow but coarse and somewhat separated medially, becoming closer laterally and on lateral faces, dorsal area distinctly punctate medially, becoming rugose at each side; basal abdominal tergum with rather deep and distinct, moderately coarse, well separated punctures medially, becoming closer laterally and somewhat closer and finer toward the narrow

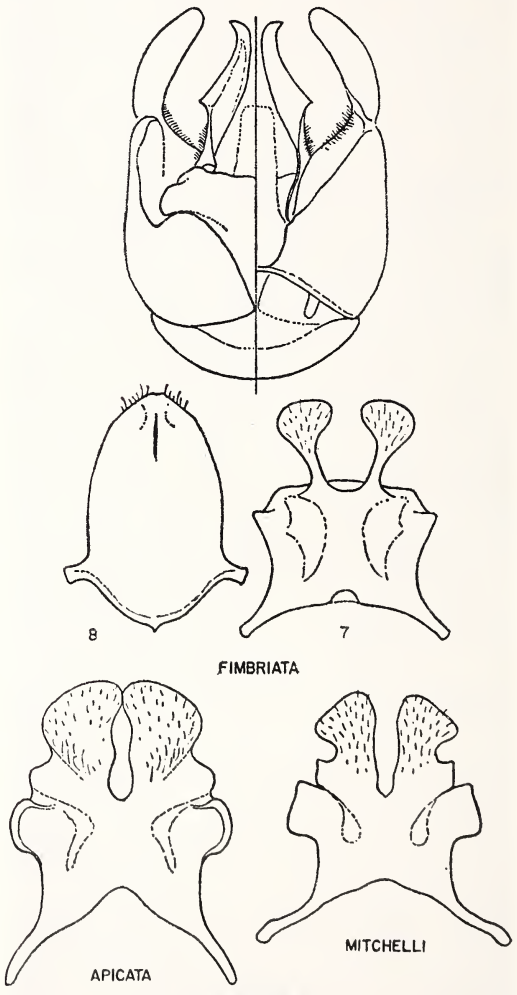


Figure 83
Sternum 7 in males of *M. (Apomelissodes)*; sternum 8 and genital armature in *M. (A.) fimbriata*.

impunctate apical margin; discs of terga 2-4 with quite deep, distinct and rather sparse punctures medially, these becoming somewhat closer laterally, rather abruptly densely crowded along margin of the impunctate, depressed apical margins; terga 5 and 6 more finely and closely punctate, becoming densely so on 6 laterally; tergum 5 with an obscure angle on each extreme side; tergum 6 with a corresponding, rather slender, subtriangular, spine-like projection; scutum and scutellum with abundant, rather long and erect, blackish pubescence, scutum with whitish pubescence anteriorly, which extends along lateral margins to the propodeum; head, thorax and legs otherwise whitish pubescent; abdominal terga 1 and 2 entirely pale pubescent, 2 with a thin, basal, white fascia, usually covered by rim of tergum 1, terga 2-5 with whitish fasciae occupying the rather narrow, depressed, apical margins of each; discs of terga 3-6 with rather abundant, erect, black pubescence; tergum 6 not fasciate, fully exposed to apical rim; pygidial plate strongly elevated basally, with subparallel, lateral, carinate margins, abruptly constricted before apex which is rather broadly subtruncate; sterna 7 and 8 and genital armature as shown (fig. 83).

DISTRIBUTION—Virginia to Georgia, west to Texas and Kansas, April to July.

FLOWER RECORDS — Females visit *Oenothera,* in North Carolina chiefly *O. laciniata,* but males have been collected on *Helianthus* and *Kneiffia.*

Melissodes (Apomelissodes) mitchelli LaBerge

(Fig. 83)

Melissodes (Apomelissodes) mitchelli LaBerge, 1956. Univ. Kans. Sci. Bul. 38, p. 556. ♂ ♀.

FEMALE—Length 10-11 mm., breadth of abdomen 4 mm.; black, including labrum, mandibles and tegulae, the antennal flagellum rather brownish-piceous beneath, black above; apical tarsal segments becoming somewhat brownish-testaceous, spurs pale testaceous; wings subhyaline basally, becoming lightly infuscated apically, veins testaceous to piceous; apical margins of abdominal terga narrowly testaceous; cheeks slightly narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum slightly less than twice the length of segment 2 which is about as broad as long; clypeus and supraclypeal area shining and sparsely punctate medially, punctures becoming rather coarse, close and shallow on clypeus laterally, fine and close apically; punctures of labrum rather uniformly fine and close; lateral areas of face rather closely and shallowly punctate below level of antennae, becoming more sparsely punctate above and in median area where surface is shining; vertex closely and rather finely punctate back of ocelli, punctures becoming more distinctly separated but still quite close laterally and on cheeks; scutum shining, punctures quite coarse, well separated over posterior half, becoming fine and quite densely crowded laterally and anteriorly, finer and rather irregular but well separated over most of scutellum; mesopleura dull, punctures rather coarse and shallow but somewhat variable; posterior face of propodeum rather dull, punctures rather coarse and numerous but somewhat separated, dorsal area largely impunctate medially, but becoming rather finely punctate at each side, lateral faces quite fully punctate, coarsely so posteriorly, becoming very finely and densely so anteriorly and below; disc of basal abdominal tergum rather dull, median punctures very minute and obscure, quite sparse, becoming somewhat more distinct and close toward each side; discs of terga 2 and 3 rather dull, median punctures very minute and well separated, becoming somewhat closer but still obscure laterally; tergum 4 with much more distinct, deep and fine punctures which become quite close at each extreme side; median length of pygidium somewhat greater than basal width, margins sub-parallel, apex broadly rounded; pubescence of head largely white, but with a few dark hairs back of ocelli; scutum and scutellum largely covered with erect and rather copious, fuscous pubescence, scutum very narrowly whitish pubescent anteriorly, this extending very narrowly along lateral margins to propodeum, thorax otherwise whitish pubescent; legs whitish pubescent in large part, but front and mid tibiae with a fuscous pubescent patch on outer surface, scopa entirely whitish, of rather elongate robust hairs which are very sparsely plumose; basal abdominal tergum with rather elongate, whitish pubescence anteriorly and laterally, otherwise bare; terga 2 and 3 with basal, white tomentose fasciae that are usually covered by the preceding tergal plate, and with dense whitish fasciae occupying the depressed apical margins nearly to the rim, that on 2 widely interrupted medially, slightly so on 3, discs with very short and obscure, dark pubescence, more evident on extreme sides; disc of tergum 4 quite densely, short, fuscous pubescent, with a few elongate apical dark hairs that overly the rather broad, dense, apical, white fascia; tergum 5 entirely covered with fuscous pubescence, obscuring the surface, that on 6 dense and more brownish on each side of pygidium.

MALE—Length 11 mm., breadth of abdomen 4 mm.; black, clypeus bright yellow, labrum and mandibles black in large part, antennal flagellum brownish-testaceous beneath, piceous above, apical tarsal segments becoming dull testaceous, spurs testaceous, and tegulae black; wings subhyaline basally, becoming very faintly clouded apically, veins testaceous to brownish; abdominal terga rather narrowly brownish-hyaline apically; cheeks considerably narrower than eyes; clypeus somewhat protuberant, its median length considerably greater than half the distance between eyes below; eyes slightly convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 five or six times this length; punctures of clypeus rather coarse and close, but shallow and inconspicuous, labrum more finely and closely punctate; punctures rather close and deep on lateral areas of face below antennae, becoming somewhat finer and more distinctly separated above, fine and irregular on vertex back of ocelli, and rather fine and close on cheeks anteriorly, becoming somewhat more sparse posteriorly and below; scutum and scutellum shining, punctures of scutum coarse, deep and well separated medially, becoming somewhat finer and very close laterally and anteriorly, much finer and rather sparse on scutellum medially, becoming somewhat closer and coarser laterally; pleura rather dull between quite coarse, close and shallow punctures; propodeum posteriorly somewhat shining, with scattered, rather coarse, shallow punctures, dorsal area impunctate in mid-line, becoming rather irregularly and shallowly punctate laterally, lateral faces quite coarsely and rather deeply punctate, punctures becoming considerably finer and closer below; basal abdominal tergum with rather deep and distinct but rather fine and well separated punctures medially, these becoming somewhat closer and finer at each extreme side, the apical impressed margin entirely impunctate; discs of terga 2 and 3 with fine, well separated, quite regularly distributed punctures, becoming slightly closer at extreme sides; discs of terga 4 and 5 much more finely, deeply, distinctly and closely punctate; punctures of tergum 6 obscured by dense pubescence; tergum 5 not distinctly angulate or spinose laterally, but tergum 6 with a small, carina-like, triangular, lateral process at each side; pubescence of head largely creamy-white, with a very few dark hairs around ocelli; scutum and scutellum with rather abundant, erect, fuscous pubescence, the scutum very narrowly pale pubescent anteriorly and along lateral margin to the propodeum, thorax and legs otherwise whitish pubescent; basal abdominal tergum with copious, elongate and erect, whitish pubescence anteriorly and laterally, largely bare otherwise; terga 2 and 3 with basal, whitish fasciae that are usually covered by the preceding plates; terga 2-5 with apical, dense, whitish fasciae, largely occupying the rather narrow, depressed, apical margins, discs with dark pubescence that is short on tergum 2, becoming progressively more elongate on the more apical segments, with elongate black hairs more or less overlying the white fasciae; pubescence of terga 6 and 7 entirely fuscous or black; pygidial plate strongly elevated toward base, with subparallel, lateral, carinate margins, abruptly constricted before apex which is rather broadly subtruncate; sternum 7 as shown (fig. 83); sternum 8 similar to *fimbriata* but more broadly rounded apically; genital armature as in *fimbriata*.

DISTRIBUTION — North Carolina to Florida, April and May.

FLOWER RECORD—No collections have been on other than *Opuntia*.

Melissodes (Callimelissodes) coloradensis Cresson

(Fig. 84)

Melissodes coloradensis Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 200. ♀ ♂.
Melissodes (Callimelissodes) coloradensis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 346.

FEMALE—Length 14-16 mm., breadth of abdomen 5.5 mm.; black, including clypeus, labrum and tegulae; mandibles with a vague, subapical yellowish area; segments of flagellum beyond the 2nd brownish-testaceous beneath, black above; apical tarsal segments becoming testaceous; wings quite deeply infuscated, veins piceous; cheeks distinctly narrower than eyes; clypeus not markedly protuberant, its median length about half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum nearly twice the length of segment 2, the latter slightly longer than broad; clypeus somewhat shining between coarse, close and deep punctures, these becoming finer and more densely crowded apically, labrum somewhat more finely but very closely and deeply punctate; median area of face, above and on each side of clypeus, rather closely and deeply punctate, lateral areas above antennae becoming smooth and very sparsely punctate, vertex and cheeks with fine and well separated punctures; scutum, scutellum and mesopleura shining between coarse and deep punctures, these rather widely separated on scutum medially, much closer and finer laterally and anteriorly, somewhat finer and evenly distributed on scutellum, rather close over most of pleura; propodeum dull and tessellate, punctures rather coarse, shallow and

well separated, becoming closer on lateral faces, dorsal area becoming rather coarsely and shallowly rugoso-punctate on each side, lateral faces becoming somewhat more shining and sparsely punctate below and along anterior margin; abdominal terga with rather deep and distinct punctures, these rather widely separated medially on basal tergum, becoming progressively closer on the more apical terga, and becoming obsolescent toward apical margin of each plate, the rather narrow apical margins impunctate; median length of pygidium considerably greater than basal width, gradually narrowed to the rather broadly rounded apex; pubescence of head entirely pale ochraceous; scutum and scutellum with short, erect, fuscous, pubescence in large part, the scutum pale pubescent only across the narrow anterior margin, and scutellum with a few pale hairs around posterior margin, thorax otherwise pale ochraceous pubescent; legs, including scopa, largely pale ochraceous pubescent, but fore and mid tibiae with somewhat darker hairs on outer face, scopal hairs densely plumose; basal abdominal tergum with rather copious, erect, pale ochraceous pubescence across base; tergum 2 with a narrow, basal, ochraceous fascia and with a vestige of a pale subapical fascia on each extreme side; tergum 3 with a subapical, rather narrow, pale fascia that is widely interrupted medially; and tergum 4 with a rather broad, apical fascia which is partially interrupted medially on the apical margin; discal pubescence of these tergal plates very short and inconspicuous, but erect and entirely dark, that on 4 more abundant, entirely dark on 5, forming a blackish or fuscous apical fimbria of long appressed hairs along posterior margin, these becoming pale at each extreme side, and pubescence of tergum 6 dark on each side of pygidium.

MALE—Length 14.5-16 mm., breadth of abdomen 5-5.5 mm.; black, the clypeus, labrum and base of mandibles bright yellow, mandibles dark apically but with an outer, orange maculation covering most of apical half; flagellum brownish-testaceous beneath, piceous above, apical tarsal segments brownish-testaceous, spurs brownish-testaceous, tegulae black; wings uniformly pale brownish, veins brownish to piceous; cheeks distinctly narrower than eyes; clypeus not markedly protuberant, its median length slightly greater than half the distance between eyes below; eyes slightly convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 about six times this length; punctures of clypeus rather coarse and distinct, slightly separated, those of labrum somewhat finer and closer, rather fine and densely crowded on each side of face above clypeal margin, becoming somewhat more distinctly separated above antennae, rather coarse and well separated on vertex laterally and over most of cheeks; scutum and scutellum somewhat shining between deep, distinct punctures, these rather coarse, slightly separated in center of scutum, becoming somewhat finer and very close laterally and anteriorly, well separated but hardly sparse on scutellum, close, deep and coarse beneath dense pubescence on pleura; punctures coarse but rather shallow on the dull posterior face of propodeum, lateral faces somewhat more shining, quite fully punctate, dorsal area impunctate on midline, but becoming irregularly rugose lateral-

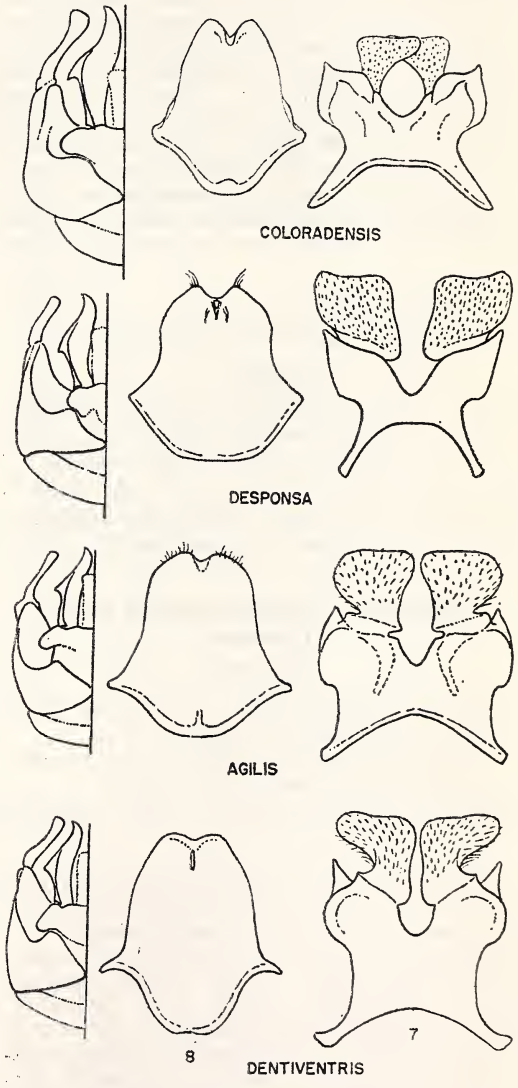


Figure 84
Genital armature and sterna 7 and 8 in males of *Melissodes*.

ly; discs of abdominal terga deeply and rather coarsely punctate, rather sparsely so medially, but otherwise rather close, invading to a considerable degree the impressed apical areas, only the rather narrow apical rims impunctate; terga 4-6 dull, punctures fine and densely crowded; tergum 5 with an obscure angle at each extreme side, and tergum 6 with a corresponding pronounced, triangular spine at each side; scutellum and posterior half or more of scutum covered with suberect and rather copious, fuscous pubescence, otherwise entire head, thorax, legs and basal abdominal tergum pale ochraceous pubescent; tergum 2 with a narrow and rather obscure band of pale pubescence across base, usually covered by tergum 1; terga 3 and 4 with ochraceous fasciae evident at each side, widely interrupted medially on 3, more narrowly so on 4, tergum 5 with a similar, more apical, ochraceous fascia, interrupted on apical margin medially; median length of pygidial plate considerably less than basal width, slightly narrowed apically, with a subapical constriction, apex abruptly and rather broadly truncate; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION—California to North Carolina, through Illinois and Ohio.

FLOWER RECORDS—According to LaBerge (1961) *Helianthus* is the primary source of pollen for *coloradensis*, but it has been recorded as visiting also species of the following: *Cirsium, Coreopsis, Heliopsis, Liatris, Lythrum, Rudbeckia, Silphium, Solanum, Solidago, Verbena* and *Vernonia.*

Melissodes (Eumelissodes) agilis Cresson

(Fig. 84)

Melissodes agilis Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 204. ♂.

Melissodes aurigenia Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 212. ♀ ♂.

Melissodes (Eumelissodes) agilis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 382.

FEMALE—Length 10.5-15 mm., breadth of abdomen 4-5 mm.; black, mandibles with an obscure yellowish spot apically; segments of flagellum beyond the 2nd brownish-testaceous below, black above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae testaceous, but obscured by dense pubescence; wings whitish-hyaline, veins testaceous to brownish; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum less than twice the length of segment 2, shorter side of the latter about equal to its apical width; clypeus rather dull, punctures quite coarse, close and deep, those on labrum somewhat more widely separated; supraclypeal area largely impunctate medially, lateral areas of face below antennae very closely and finely punctate, becoming minutely punctate above where surface is shining, somewhat more coarsely and deeply punctate medially; vertex with fine and close punctures medially; cheeks shining, closely punctate posteriorly, becoming minutely and obscurely punctate toward margin of eye; scutum and scutellum quite coarsely and deeply punctate beneath dense pubescence; punctures rather coarse and slightly separated on scutum medially, becoming closer and finer laterally and anteriorly, quite coarse and slightly separated on scutellum; punctures of pleura rather coarse and shallow, slightly separated, becoming somewhat finer and closer posteriorly; posterior face of propodeum dull, punctures very shallow and vague, dorsal area dull but shallowly rugose, lateral faces somewhat more shining and more closely and finely punctate, becoming quite smooth below; discs of abdominal terga with fine, slightly separated punctures across basal half, tergum 1 impunctate apically, 2 and 3 with very minute and sparse punctures apically, 3-5 with very fine, densely crowded punctures basally; pygidium elongate-triangular, apex narrowly rounded; pubescence entirely bright ochraceous or fulvous on head and thorax, ochraceous on legs, with some brownish hairs on front basitarsi and mid tibiae, hind tibial scopa ochraceous, the hairs quite densely plumose; basal abdominal tergum with copious, erect and rather long, ochraceous pubescence, with no dark hairs in evidence; tergum 2 with a basal, yellowish fascia and a submedian fascia, the intervening pubescence thin and entirely pale; tergum 3 with a somewhat broader, subapical, ochraceous fascia, and 5 with a broad, dense, uninterrupted, apical tomentose area; tergum 5 largely fuscous pubescent, with some elongate ochraceous hairs on each side, apical margin largely occupied by a dense fuscous fimbria; tergum 6 fuscous pubescent on each side of pygidium.

MALE—Length 9-12 mm., breadth of abdomen 3.5-4 mm.; black, the clypeus entirely, labrum in large part, and base of mandibles, yellow, labrum black at each extreme side; segments of flagellum beyond the 1st pale testaceous beneath, brownish above; apical tarsal segments brownish-testaceous, spurs pale yellow; tegulae covered with dense, pale pubescence; wings whitish-hyaline, veins pale testaceous; apical margins of abdominal terga broadly pale yellowish-hyaline; cheeks consid-

erably narrower than eyes; clypeus only very slightly protuberant, its median length very slightly greater than distance between eyes below; eyes rather strongly convergent below; shorter side of basal segment of flagellum very little longer than pedicel, segment 2 six or seven times longer; punctures of clypeus rather deep and close, moderately coarse, but obscured by the yellow color and abundant pubescence, those on labrum somewhat closer and coarser; supraclypeal area largely impunctate, but lateral areas of face above clypeus very finely but distinctly punctate, punctures becoming minute and more widely separated above, between eyes and ocelli; vertex rather finely and closely punctate, and cheeks with deep, distinct but rather fine, well separated punctures which become very minute toward eye margin; scutum and scutellum shining between quite deep, distinct and rather coarse punctures, these well separated medially over posterior half, becoming somewhat finer and closer laterally and anteriorly, well separated also on scutellum; punctures of peura well separated, rather coarse and shallow, becoming finer and closer posteriorly; posterior face of propodeum rather dull, the punctures shallow but rather coarse, irregularly scattered, dorsal area dull, becoming rather coarsely rugoso-punctate, lateral faces with rather close and coarse punctures posteriorly, becoming finer and more obscure anteriorly and below; discs of abdominal terga with distinct but rather shallow punctures, these rather coarse on basal tergum, becoming progressively finer and closer on the more apical terga, apical margins with only very minute, widely scattered and sparse punctures; tergum 5 obscurely angulate at each extreme side, and tergum 6 with a triangular, acute, spine-like posterior projection on each extreme side; pubescence entirely whitish or pale ochraceous on head, thorax and legs, somewhat more yellowish on tarsal segments, almost brownish on basitarsi beneath; basal abdominal tergum with copious, elongate and more or less erect, pale ochraceous pubescence; tergum 2 with a broad, loose, pale, basal fascia, covered in part by disc of tergum 1, and terga 2-5 with pale yellowish fasciae that border the apical hyaline margins, the more basal pubescence on each thinner but entirely pale and suberect; median length of pygidial plate somewhat greater than basal width, margins somewhat converging apically to a deep subapical constriction, the apex rather broadly truncate; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION—With the apparent exception of Florida, *agilis* occurs throughout the United States, Southern Canada and Northern Mexico, and is in flight from May to November in the East.

FLOWER RECORDS—LaBerge (1961) states that *agilis* is apparently an oligolege of *Helianthus*. Other plants visited, including records from the literature, are species of *Abutilon, Althaea, Aplopappus, Arctium, Argemone, Bidens, Blephilia, Brassica, Brauneria, Carduus, Carya, Cassia, Centromadia, Chrysopsis, Chrysothamnus, Cirsium, Clematis, Cleome, Convolvulus, Coreopsis, Cosmos, Datura, Enceliopsis, Engelmannia, Ericameria, Eupatorium, Eustoma, Gaillardia, Grindelia, Gutierrezia, Haplopappus, Helenium, Heliopsis, Heliotropium, Hibiscus, Ipomoea, Lactuca, Lepachys, Liatris, Medicago, Melilotus, Mentha, Monarda, Penstemon, Pepo, Petalostemum, Phacelia, Physostegia, Platycodon, Pluchea, Prionopsis, Pycnanthemum, Pyrrhopappus, Rudbeckia, Schrankia, Senecio, Silphium, Sium, Solidago, Teucrium, Verbena, Verbesina, Vernonia, Veronica, Vitex* and *Wistizenia.*

Melissodes (Eumelissodes) bidentis Cockerell

Melissodes bidentis Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 14, p. 362. ♀.
Melissodes (Eumelissodes) bidentis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 400.

FEMALE—Length 9 mm., breadth of abdomen 3.5 mm.; black, the apical tarsal segments becoming somewhat brownish on mid and hind legs; tegulae brownish-piceous; wings lightly infuscated, veins brownish to piceous; spurs pale testaceous; cheeks considerably narrower than eyes; clypeus very slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; clypeus dull and densely tessellate, the punctures rather coarse but shallow, slightly separated above, becoming densely crowded toward apical margin, those on labrum somewhat closer and deeper; supraclypeal area very sparsely punctate, lateral areas of face above clypeus finely and rather closely punctate, the punctures becoming minute and sparse above on each side where surface is shining, median area below ocelli relatively dull and closely punctate; vertex rather closely and finely punctate behind ocelli; cheeks shining, minutely punctate, punctures somewhat coarser toward posterior margin; scutum shining between the deep, distinct and rather coarse punctures, these slightly separated on posterior half medially, becoming

finer and closer laterally and anteriorly, fine and irregular on scutellum; pleura somewhat shining between rather coarse and deep punctures, these well separated medially, becoming somewhat finer and more obscure posteriorly and anteriorly, posterior face of propodeum densely tessellate, finely and rather closely punctate, dorsal area dull and rather shallowly rugose, lateral faces somewhat shining, with fine, well separated punctures; basal abdominal tergum with fine but rather distinct, well separated punctures across base, apical area entirely impunctate; terga 2 and 3 very minutely and obscurely punctate, punctures hardly visible even at high magnification; terga 4 and 5 dull, minutely and very closely punctate; pygidium elongate-triangular, apex narrowly rounded; pubescence of head entirely yellowish, and dorsum of thorax, entire propodeum and upper part of pleura, pale yellowish, pleura below and legs in large part fuscous to black, the hind tibial scopa yellowish, hairs abundantly plumose; basal abdominal tergum with some copious, more or less erect, yellowish pubescence across anterior face, and with some dark, suberect, fuscous pubescence at each extreme side; following terga with no evident pale pubescence or fasciae, discal pubescence very short, obscure, suberect, largely fuscous, hairs at extreme sides of 5 and 6 somewhat paler.

MALE—Length 9 mm., breadth of abdomen 3.5 mm.; black, the entire clypeus, median basal area of labrum, and outer apex of mandibles, yellow; segments of flagellum beyond the 1st testaceous beneath, piceous above; apical tarsal segments only slightly brownish, spurs pale yellowish; tegulae rather dark, with abundant pale pubescence; wings subhyaline, veins testaceous to brownish; apical margins of abdominal terga quite broadly yellowish-hyaline; cheeks slightly narrower than eyes; clypeus little if any protuberant, median length somewhat greater than half distance between eyes below; eyes rather strongly convergent below; shorter side of basal segment of flagellum very slightly longer than pedicel, segment 2 fully four times this length; punctures of clypeus close and rather coarse but not very deep, those on labrum somewhat closer, deeper and more distinct; supraclypeal area largely impunctate, lateral areas of face above clypeus with rather fine, well separated punctures, these becoming more minute above where surface is shining, median area below ocelli quite closely punctate; vertex rather closely punctate behind ocelli, cheeks shining and very finely punctate; scutum shining between rather coarse, deep and distinct punctures, these well separated medially over posterior half, becoming close laterally, anteriorly and narrowly along posterior margin, those on scutellum rather sparse on each side; pleura with rather coarse, close and deep punctures, well separated medially, becoming close beneath wing bases; posterior area of propodeum dull, punctures rather fine, shallow and scattered, dorsal face rather coarsely, irregularly rugose, lateral faces rather dull, with close punctures posteriorly, punctures becoming minute and vague anteriorly and below; basal abdominal tergum with fine, slightly separated punctures across basal area of disc, these becoming more minute and sparse toward apical margin; terga 2-4 with very fine, rather well separated punctures across disc, apical impressed areas largely impunctate; tergum 5 dull and densely tessellate, the punctures minute, obscure but well separated, this plate not conspicuously angulate laterally; tergum 6 with a narrowly rounded, subtriangular, spine-like apical projection on each side; pubescence entirely whitish-ochraceous on head, thorax, legs and basal abdominal tergum; tergum 2 with a thin, basal, whitish fascia largely obscured by the preceding tergal plate and with a subapical fascia that borders the depressed apical margin, this widely interrupted medially, disc otherwise with very short, inconspicuous, more or less erect, darker pubescence, terga 3 and 4 with subapical, whitish fasciae also bordering the depressed apical margin, basal pubescence more elongate and erect, somewhat darker, tergum 5 not conspicuously fasciate but with a few pale hairs along the margin of the depressed area, 6 with fuscous pubescence basally but apical margin fringed with somewhat paler brownish hair; median length of pygidial plate somewhat greater than basal width, margins slightly convergent apically to a rather abruptly constricted apex which is rather broadly truncate.

DISTRIBUTION—Texas to North Dakota, east to New York, July to October.

FLOWER RECORDS—According to LaBerge (1961) *bidentis* has been collected on species of *Bidens, Echinacea, Gossypium, Helianthus, Physostegia, Rudbeckia* and *Sonchus*.

Melissodes (Eumelissodes) boltoniae Robertson

Melissodes boltoniae Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀.
Melissodes melandri Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 109. ♀.
Melissodes (Eumelissodes) boltoniae LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 482.

FEMALE—Length 9-13 mm., breadth of abdomen 4-4.5 mm.; black, the mandibles with

a small yellowish subapical spot; apical tarsal segments somewhat brownish, spurs pale testaceous, antennae and tegulae entirely black; wings subhyaline, faintly clouded apically, veins piceous to black; cheeks much narrower than eyes; clypeus but very slightly protuberant, its median length slightly less than distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum about one and a half times the length of segment 2, shorter side of the latter about equal to the breadth; punctures of clypeus coarse, close and deep, those on labrum very close and fine medially, becoming quite sparse laterally; lateral areas of face between clypeus and level of antennae closely and quite finely punctate, the supraclypeal area narrowly impunctate medially, punctures becoming very minute and sparse above, where surface is shining between eyes and ocelli, median area below ocelli quite deeply and distinctly punctate; vertex minutely and closely punctate behind ocelli, becoming minutely and rather sparsely punctate laterally, cheeks shining, with minute and rather sparse punctures; scutum somewhat shining, punctures coarse and deep, quite sparse over posterior half medially, becoming much closer and finer laterally and anteriorly, those on scutellum somewhat finer and quite close; punctures of pleura quite close, coarse and deep throughout; posterior face of propodeum rather smooth but dull, punctures rather fine, very shallow, well separated, dorsal area becoming coarsely reticulate along upper margin, lateral faces dull and shallowly punctate, becoming narrowly shining below; basal abdominal tergum with rather coarse but shallow, well separated punctures across basal half, these becoming closer and deeper laterally, and nearly reaching the apical margin on each side, the rather broad median apical area entirely impunctate; terga 2 and 3 with close, rather fine punctures across basal half, those on 2 somewhat coarser and deeper than on 3, apical impressed areas smooth, with only scattered, exceedingly minute punctures evident; terga 4 and 5 densely and finely rugoso-punctate across base, apical areas obscured by pubescence; pygidium elongate triangular, apex narrowly rounded; pubescence of face and cheeks white, vertex with conspicuous, erect, black pubescence across top of head, but posterior margin white pubescent; scutellum entirely black pubescent and scutum largely so, with only a narrow anterior white pubescent area, the pleura and propodeum entirely white; coxae, trochanters and femora pale pubescent, the front tibiae and tarsi more fuscous pubescent, mid tibia with a fuscous, subapical patch on outer surface, tarsi with pale pubescence basally, becoming more or less infuscated apically; hind tibial scopa whitish, becoming somewhat infuscated at apex of basitarsi, the hairs quite densely plumose; basal abdominal tergum largely white pubescent across base, with some inconspicuous, short, suberect black hairs on disc at each extreme side; terga 2 and 3 with submedian, slightly oblique, white fasciae, that on 2 interrupted medially, basal areas of discs with very short, inconspicuous, erect blackish hairs, and with rather sparse black hairs on apical impressed area; tergum 4 with a subapical, dense, white fascia separated from rim medially by a narrow band of fuscous tomentum, basal area with quite long and erect, black pubescence; terga 5 and 6 entirely black pubescent.

MALE—Length 8-10 mm., breadth of abdomen 3-4 mm.; black, clypeus entirely yellow, labrum black, and mandibles black except for an obscure, pale yellowish, subapical infusion; antennal flagellum testaceous beneath, brownish-piceous above; apical tarsal segments testaceous, spurs pale yellow; tegulae brownish; wings subhyaline, veins testaceous; impressed apical terga more or less yellowish-hyaline; cheeks about half width of eyes; clypeus very slightly protuberant, its median length about half distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum very short, no longer than pedicel, segment 2 about four times longer than segment 1 and pedicel combined; punctures of clypeus rather coarse and close, somewhat obscured by the yellow coloration, those on labrum fine and close but quite shallow, somewhat more widely separated toward each side; face above clypeus quite deeply and distinctly punctate on each side, the punctures slightly separated, becoming more minute above where the surface is shining; vertex with close and rather distinct punctures behind ocelli, becoming sparse on each side, cheeks somewhat shining beneath the dense pubescence, punctures minute and rather well separated; scutum somewhat shining between quite coarse, deep and distinct punctures, these quite sparse over posterior half of disc, becoming somewhat closer laterally and anteriorly, those on scutellum about equal in size, well but not widely separated; pleura with deep, distinct, rather coarse punctures, these rather well separated medially, becoming somewhat closer anteriorly and below; posterior face of propodeum smooth but rather dull, punctures shallow and rather sparse, dorsal area becoming rather coarsely rugoso-punctate along upper margin, lateral faces quite dull, punctures quite close but shallow and irregularly scattered; basal abdominal tergum well covered with deep, distinct, rather coarse and well separated punctures, these becoming somewhat closer at extreme sides and nearly reaching the apical margin where they become minute and rela-

tively sparse; discs of terga 2 and 3 with fine but deep and distinct punctures, these well separated across tergum 2, somewhat closer on 3, apical impressed areas with only exceedingly minute, widely scattered punctures; discs of terga 4 and 5 with fine and very close punctures basally, surface almost rugose, tergum 5 with a distinct but short, spine-like, latero-apical angle on each side, and tergum 6 with a corresponding triangular spine-like projection; pubescence of head, thorax and legs largely pale ochraceous, with only a slight amount of fuscous or blackish hairs on scutellum and on scutum posteriorly; basal abdominal tergum with copious, erect, pale ochraceous pubescence anteriorly, and some short, suberect, fuscous pubescence across apical half of disc; tergum 2 with a narrow, basal, pale fascia which is largely covered by the preceding tergum; terga 2-4 with narrow, pale ochraceous fasciae occupying the basal margin of apical impressed areas, the discs otherwise covered with suberect, fuscous or blackish pubescence; tergum 5 with a more nearly apical, pale ochraceous fascia, disc otherwise covered with rather elongate, blackish pubescence, becoming somewhat pale at each extreme side; median length of pygidial plate somewhat greater than basal width, carinate laterally, margins very slightly convergent to a rather abrupt subapical constriction, the apex narrowly truncate; sterna 7 and 8 and genital armature as in *agilis* (fig. 84).

DISTRIBUTION—Pennsylvania to Florida, west to Texas and Nebraska, July to November.

FLOWER RECORDS—LaBerge (1961) lists species of *Abutilon, Amphiachyris, Aster, Bidens, Boltonia, Cassia, Chrysopsis, Cirsium, Coreopsis, Helenium, Helianthus, Heterotheca, Lythrum, Ratibida, Rudbeckia, Silphium, Solidago, Verbena* and *Vernonia*.

Melissodes (Eumelissodes) coreopsis Robertson

Melissodes confusa Robertson (nec Cresson), 1894. Acad. Sci. St. Louis, Trans. 6, pp. 458-460.

Melissodes coreopsis Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀.

Melissodes agilis semiagilis Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 364. ♂.

Melissodes confusiformis Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 366. ♀.

Melissodes helianthophila Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 14, p. 361. ♂.

Melissodes (Eumelissodes) coreopsis LeBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 448.

FEMALE—Length 11 mm., breadth of abdomen 4 mm.; black, including clypeus, labrum and base of mandibles, the mandibles slightly reddened apically; segments of flagellum beyond the 1st brownish-testaceous beneath, piceous above; apical tarsal segments becoming testaceous; spurs pale yellow; tegulae piceous anteriorly, becoming testaceous-hyaline posteriorly; wings hyaline, veins testaceous to brownish; cheeks subequal to eyes in width; clypeus quite flat, its median length considerably less than distance between eyes below; eyes slightly convergent below; shorter side of segment 2 of flagellum slightly more than half the length of basal segment and slightly greater than apical width; clypeus coarsely and closely punctate, punctures becoming very fine and crowded toward apical margin, those on labrum fine and close medially, becoming rather widely separated laterally; mandibles very short, length less than twice the basal width; supraclypeal area narrowly impunctate medially, lateral areas of face below antennae finely and rather closely punctate, becoming very minutely and sparsely so above antennae, surface shining and largely impunctate between eyes and ocelli; vertex closely and finely punctate behind ocelli; cheeks rather closely punctate posteriorly, becoming shining and very minutely punctate along margin of eye; scutum somewhat shining between deep, distinct and rather coarse punctures, these rather widely separated over posterior half, becoming closer and somewhat finer laterally and anteriorly, those on scutellum rather fine, well but not widely separated; punctures of pleura deep, distinct, rather coarse and close, becoming very fine and close posteriorly; posterior face of propodeum quite closely but rather shallowly punctate, dorsal area dull, finely reticulate along upper margin medially, but with a few coarse striations at each side, lateral faces dull, quite closely but shallowly punctate, punctures becoming somewhat finer anteriorly and below; basal half of basal abdominal tergum closely and quite coarsely punctate, punctures becoming finer but nearly reaching apical margin at each side, the broad, median, apical area impunctate; basal half of discs of terga 2 and 3 finely and quite closely punctate, punctures crowded on 3 laterally, apical areas smooth, with only exceedingly minute, obscure punctures evident; terga 4 and 5 finely and densely punctate across base; pygidium elongate-triangular, apex very narrowly rounded; head with some scattered, elongate, dark hairs across vertex, but otherwise whitish pubescent, with a dense, elongate, whitish fringe behind vertex and cheeks; scutellum and posterior two-thirds of scutum with rather copious, erect, fuscous pubescence, anterior third of scutum with erect, dull whitish pu-

bescence which reaches narrowly along lateral margins to propodeum, the pleura and propodeum entirely whitish pubescent; legs generally pale pubescent, with some more brownish hairs on basitarsi beneath, the hind tibial scopa pale yellowish, densely short plumose; basal abdominal tergum quite copiously, short, ochraceous pubescent anteriorly and laterally, largely bare apically; tergum 2 with a basal, whitish fascia that is largely obscured by the margin of tergum 1, and with a submedian, whitish fascia that fringes the apical impressed area, this slightly interrupted medially, disc otherwise with very thin and short, inconspicuous, pale hairs basally, apical area quite bare; terga 3 and 4 with submedian, pale fasciae bordering apical impressed area, basal area of 3 with some inconspicuous, thin, whitish tomentum and some more erect, somewhat darker but rather short hairs, apical area bare, 4 with more elongate and erect dark pubescence basally, apical area thinly, white tomentose, interrupted medially, tomentose area thus largely occupying apical half of disc; terga 5 and 6 largely dark pubescent, with some pale, elongate hairs at extreme sides.

MALE—Length 9 mm., breadth of abdomen 3.5 mm.; black, including labrum and base of mandibles, the latter with a subapical, yellowish maculation; clypeus entirely yellow; antennal flagellum pale testaceous beneath, somewhat darker above; the more apical tarsal segments testaceous, with basitarsi largely dark, spurs pale yellowish; tegulae rather dark anteriorly, becoming more testaceous posteriorly, quite densely pubescent; wings whitish-hyaline, veins pale testaceous to brownish; impressed apical margins of abdominal terga pale yellowish-hyaline; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum very short, subequal to pedicel, shorter side much less than apical width, segment 2 nearly four times combined length of segment 1 and pedicel; punctures of clypeus close and not very coarse, inconspicuous on the yellow surface, those of labrum close and fine medially, becoming rather sparse on each side; supraclypeal area shining and impunctate medially, lateral areas of face somewhat shining between minute, slightly separated punctures, these becoming even more minute between eyes and ocelli above, median area below ocelli somewhat more distinctly punctate; punctures very fine and quite close on vertex behind ocelli; cheeks shining, punctures hardly visible except along narrow posterior margin; punctures of scutum coarse, deep and distinct, quite sparse in center posteriorly, becoming relatively fine and close laterally and anteriorly, quite coarse on scutellum, well separated but hardly sparse; pleura somewhat shining between deep, distinct, rather fine, slightly separated punctures; posterior face of propodeum rather dull, punctures rather shallow and irregularly scattered, dorsal area dull, irregularly rugose along upper margin, lateral faces somewhat shining between the numerous, rather close, shallow and vague punctures; discs of abdominal terga with deep, distinct and rather close punctures, these rather coarse on basal tergum, becoming increasingly fine on the more apical terga, much closer on tergum 4, apical impressed areas largely impunctate, invaded only slightly by very minute, obscure punctures; tergum 5 only obscurely angulate at each extreme side, tergum 6 with a rather short but slender apical spine on each side; pubescence quite long and copious, entirely pale yellowish-white on head, thorax, legs and basal abdominal tergum, rather short and inconspicuous on basal areas of terga, the apical impressed areas fringed basally with more or less dense, conspicuous, pale ochraceous fasciae which are broader laterally, much thinner or interrupted medially, especially on the more basal plates, entire and subapical on 4 and 5, the erect basal pubescence thin but entirely pale; terga 5 and 6 pale tomentose to the rims; median length of pygidial plate about equal to basal width, margins sharply carinate, slightly convergent apically to the abruptly constricted tip which is rather narrowly subtruncate.

DISTRIBUTION — Alberta and North Dakota to Mexico, east to Illinois, June to October.

FLOWER RECORDS—LaBerge (1961) lists species of the following: *Amphiachyris, Amorpha, Aster, Bidens, Boltonia, Chrysopsis, Chrysothamnus, Cirsium, Clematis, Cleome, Cooperia, Convolvulus, Coreopsis, Cosmos, Echinacea, Erucastrum, Eryngium, Eupatorium, Euphorbia, Eustoma, Gaillardia, Geranium, Gossypium, Grindelia, Gutierrezia, Haplopappus, Helenium, Heterotheca, Helianthus, Heliopsis, Marrubium, Medicago, Melilotus, Monarda, Nepeta, Opuntia, Parosela, Petalostemum, Prionopsis, Psoralea, Ratibida, Rudbeckia, Salsola, Siphium, Solidago, Tetragonotheca, Tetraneuris, Trifolium, Verbena, Verbensina* and *Vernonia.*

Melissodes (Eumelissodes) denticulata Smith

Melissodes denticulata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 311. ♂.

Melissodes senilis Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 311. ♀.

Melissodes perplexa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 206. ♂.

Melissodes vernoniana Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 368. ♀ ♂.

Melissodes perplexa Mathewson and Daly, 1955. Kans. Ent. Soc. Jour. 28, p. 120. (biology)

Melissodes (Eumelissodes) denticulata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 511.

FEMALE—Length 9.5-11 mm., breadth of abdomen 4-5 mm.; black, the mandibles with a subapical, testaceous maculation; segments of flagellum beyond the 2nd somewhat more piceous beneath, but black above; apical tarsal segments becoming brownish-testaceous; spurs pale testaceous; tegulae piceous to black; wings faintly infuscated, veins brownish to piceous; lower portion of cheeks nearly as broad as eyes; clypeus only very slightly protuberant, its median length half the distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum slightly more than half the length of segment 1, slightly longer than broad; punctures of clypeus quite coarse, deep and close, becoming fine and densely crowded along apical margin, those on labrum somewhat finer and closer medially, becoming quite coarse but still close laterally; supraclypeal area with quite coarse, well separated punctures medially, these becoming fine and close laterally; lateral areas of face with fine and rather close punctures below level of antennae, becoming minute and sparse above on each side, but quite coarse and distinct below ocelli; vertex with fine, close and distinct punctures behind ocelli; cheeks somewhat shining, punctures minute, becoming somewhat coarser and closer posteriorly; scutum somewhat shining between the moderately coarse and deep punctures, these quite sparse medially over posterior half, becoming somewhat finer and very close laterally and anteriorly, those on scutellum about equally coarse, well separated but hardly sparse; punctures of pleura coarse, rather deep and quite close, becoming much finer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures rather shallow, irregularly scattered, becoming quite close at each side, dorsal area rather coarsely reticulate along margin, lateral faces rather dull, punctures rather shallow but generally distributed; basal abdominal tergum with shallow but rather coarse, quite sparse punctures across basal half, becoming somewhat finer and closer at each extreme side, apical half largely smooth and impunctate; basal half of tergum 2 smooth, with sparse, exceedingly minute and obscure punctures that are barely evident, apical half entirely impunctate; terga 3 and 4 more distinctly but very finely punctate across basal half, punctures rather well separated on 3, close on 4, minute and vague on 4 apically; pygidium elongate-triangular, apex rather narrowly rounded; pubescence of head largely whitish, but with a conspicuous band of long, fuscous hairs across vertex, and a few fuscous hairs intermixed with the white along margins of eye below; scutum and scutellum largely covered with rather short but erect and conspicuous fuscous pubescence, scutum narrowly pale pubescent across anterior margin, a few fuscous hairs intermixed among the light on tubercles and on pleura above; otherwise pleura and propodeum whitish pubescent; coxae, trochanters and femora largely whitish pubescent, the fore and mid tibiae with a somewhat darker patch on outer surface apically, and basitarsi largely fuscous pubescent; hind tibial scopa pale yellowish, the hairs abundantly plumose; basal abdominal tergum rather thinly short pubescent anteriorly, the pubescence entirely whitish; tergum 2 with a basal, whitish fascia that is largely obscured by the margin of tergum 1, and with a submedian fascia bordering the apical impressed area, which is rather widely interrupted medially, the intervening area with some very short, inconspicuous, suberect, black pubescence; tergum 3 with a submedian fascia bordering the impressed apical area, very slightly interrupted medially, basal area with thin and sparse, whitish tomentum and a few rather short, erect, blackish hairs, apical area beyond the fascia entirely bare; apical impressed area of tergum 4 largely whitish tomentose, somewhat interrupted along apical margin medially, basal area with somewhat more elongate, black pubescence; terga 5 and 6 entirely blackish to fuscous pubescent.

MALE—Length 9-11 mm., breadth of abdomen 3-4 mm.; black, clypeus yellowish-white, with upper third or fourth invaded by black; labrum black, often with a median yellowish-white maculation; mandibles with a small, subapical, testaceous spot; flagellum brownish beneath, piceous above; apical tarsal segments becoming brownish-testaceous, the spurs pale testaceous; tegulae piceous; wings faintly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus somewhat protuberant, its median length somewhat greater than half the distance between eyes below; eyes somewhat convergent below; shorter side of basal segment of flagellum about equal to pedicel, segment 2 seven or eight times as long; punctures of clypeus quite close but not very coarse, becoming fine and densely crowded along apical margin, those on labrum

fine and close along mid-line, becoming quite coarse, deep and conspicuous at each side; supraclypeal area with fine, sparse punctures, lateral areas of face below antennae dull, with rather fine and close but distinct punctures, these becoming more minute and more widely separated on the shining surface between eyes and ocelli; punctures below ocelli rather deep and distinct, quite close, the surface dull; punctures fine and close on vertex behind ocelli, becoming rather sparse on each side; cheeks with quite deep, distinct and close punctures that are rather coarse posteriorly, very fine along margin of eye; scutum somewhat shining between deep, distinct, and rather coarse punctures, these quite sparse across posterior half, becoming much finer and closely crowded laterally and anteriorly, those on scutellum about equal in size, rather sparse on each side; pleura with rather uniformly coarse, close and deep punctures, becoming somewhat finer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures not very coarse but quite shallow, separated to some degree on each side, dorsal area becoming rather coarsely rugose along upper margin, lateral faces dull and quite finely and closely punctate; the punctures obsolescent anteriorly and below; basal abdominal tergum with coarse and deep punctures across base, these well separated medially, becoming somewhat closer laterally, fine and more sparse toward the rather narrowly impunctate apical margin; terga 2 and 3 with very fine, well separated punctures across base, somewhat closer on 3 than on 2, apical impressed areas largely smooth and impunctate; terga 4 and 5 quite closely, deeply and rather finely punctate across base, apical impressed areas impunctate; tergum 5 with a rather obscure, obtuse angle at each extreme side, and 6 with a corresponding distinct apical spine; pubescence of head largely yellowish-white, but vertex with abundant, erect, conspicuous, fuscous pubescence across top of head; scutum and scutellum largely covered with conspicuous, erect, fuscous or blackish pubescence, scutum rather narrowly whitish pubescent across anterior margin, the pleura, propodeum and legs pale pubescent; basal abdominal tergum with rather copious, erect, whitish pubescence anteriorly and laterally, disc with some very short, suberect, dark pubescence evident toward each side; tergum 2 with a rather thin and indefinite, basal, white fascia that is largely covered by disc of tergum 1, and apical impressed area narrowly fringed by a whitish fascia which is slightly interrupted medially, basal portion of disc with short, suberect, thin, blackish pubescence; apical impressed areas of terga 3-5 narrowly fringed with pale, transverse fasciae, usually complete, basal areas of each with more elongate and erect, blackish hairs; tergum 6 entirely dark pubescent; median length of pygidial plate about equal to basal width, margins strongly carinate, very slightly converging toward the abruptly constricted apex which is rather broadly truncate; sternum 7 and genital armature resembling those of *agilis* (fig. 84), but sternum 8 narrower apically, the apex more deeply emarginate.

DISTRIBUTION — The New England states and Eastern Canada, to Florida, west to North Dakota and Texas, May to October.

FLOWER RECORDS—According to LaBerge (1961) this species is primarily oligolectic on species of *Vernonia*. Males and occasional females however will visit other flowers, and he lists species of *Amphiachyris, Carduus, Convolvulus, Eupatorium, Ipomoea, Pycnanthemum, Silphium, Solidago, Symphoricarpos* and *Verbena*.

Melissodes (Eumelissodes) dentiventris Smith

(Fig. 84)

Melissodes dentiventris Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 312. ♂.
Melissodes autumnalis Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 369. ♀ ♂.
Melissodes megacerata Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 362. ♂.
Melissodes (Eumelissodes) dentiventris LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 403.

FEMALE—Length 10.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, the mandibles with an elongate, testaceous, subapical maculation; segments of flagellum beyond the 2nd more brownish-piceous beneath; apical tarsal segments somewhat more brownish apically, spurs pale testaceous; tegulae brownish-testaceous; wings very slightly but quite uniformly darkened, veins brownish to piceous; cheeks much narrower than eyes; clypeus only slightly protuberant, its median length somewhat less than half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum about one and a half times longer than segment 2 which is considerably longer than broad; clypeus dull, punctures coarse, close and deep, those on labrum much finer, rather sparse laterally; supraclypeal area shining and impunctate, the more lateral areas of face below antennae rather finely and closely punctate, lateral areas above shining and largely impunctate, the median area below ocelli rather dull, with rather fine, distinct, scattered punctures; vertex very finely and closely punctate behind ocelli, punctures sparse laterally, cheeks shining, with very minute

but rather close punctures; scutum and scutellum with coarse and deep punctures, rather well separated on scutum posteriorly, becoming closer and somewhat finer laterally and anteriorly, quite close over most of scutellum; pleura rather dull, punctures coarse and quite close but rather shallow; posterior face of propodeum dull, with rather fine and close punctures, dorsal area becoming rather densely rugose toward each side, lateral faces quite uniformly finely and closely punctate; disc of basal abdominal tergum quite fully punctate, only the narrow apical margin impunctate, punctures quite coarse, deep and close throughout; basal half of discs of terga 2 and 3 quite deeply and rather closely punctate, apical impressed areas more finely and sparsely but rather fully punctate, only the narrow apical rims impunctate, punctures of 2 somewhat coarser than those of 3, terga 4 and 5 much more densely punctate across base, 4 punctate nearly to apical rim; pygidium rather broadly triangular, apex rather broadly rounded; vertex with a transverse band of erect and elongate blackish hairs, a few blackish hairs along margins of eyes intermixed with pale, and clypeus with short but rather copious and erect fuscous pubescence, face and cheeks otherwise with pale ochraceous pubescence and vertex fringed posteriorly with the same color; scutum, scutellum, propodeum and upper part of pleura largely covered with ochraceous pubescence, but scutum and scutellum with a limited area of fuscous hairs medially, those on scutum in center of posterior half; pleura below and legs in large part black pubescent, hind tibial scopa pale ochraceous, the hairs densely plumose; basal abdominal tergum with copious, elongate, pale ochraceous pubescence anteriorly, posterior half of disc with short, suberect rather conspicuous fuscous pubescence; tergum 2 with a basal, whitish fascia which is largely covered by the preceding plate, apical impressed area narrowly bordered on each side with a few pale hairs, forming a narrow, usually poorly developed, oblique fascia, disc otherwise covered with very short suberect blackish pubescence, terga 3-5 entirely covered with blackish or fuscous pubescence, largely suberect but with some longer erect black hairs more evident toward each side.

MALE—Length 10.5-12 mm., breadth of abdomen 4-4.5 mm.; black, including labrum and base of mandibles, clypeus yellow, with upper margin narrowly blackened, mandibles with an apical testaceous maculation; antennal flagellum brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, the spurs pale yellow; tegulae quite dark, becoming narrowly yellowish posteriorly; wings subhyaline, veins testaceous; apical margins of abdominal terga becoming narrowly yellowish-hyaline; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length slightly more than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum but little longer than pedicel, segment 2 six or seven times longer; punctures of clypeus rather close, coarse and deep, those on labrum slightly finer but more distinct, supraclypeal area largely smooth and impunctate, lateral areas of face below antennae quite closely and finely punctate, punctures becoming somewhat more minute above, where the surface is shining between eyes and ocelli, median area below ocelli quite closely and distinctly punctate; vertex very closely and finely punctate behind ocelli, punctures somewhat more sparse laterally, cheeks with quite deep, distinct and rather close punctures posteriorly, the punctures becoming very fine toward margin of eye; scutum and scutellum somewhat shining between quite deep and coarse punctures, these slightly separated on scutum posteriorly, becoming much closer and somewhat finer laterally and anteriorly, quite close on scutellum; pleura somewhat less shining, punctures quite coarse, deep and distinct, close in large part; posterior face of propodeum rather dull, punctures deep, distinct and quite close but not very coarse, those on dorsal area becoming somewhat coarser medially, lateral areas more rugose or reticulate, lateral faces quite uniformly, closely and rather finely punctate; disc of basal abdominal tergum quite fully punctate, the more basal punctures quite coarse, deep and slightly separated, punctures becoming more minute, sparse and indefinite toward the rather narrowly impunctate apical rim; terga 2-4 quite deeply, distinctly and rather closely punctate basally, the punctures somewhat more widely separated on 2, becoming progressively closer on 3 and 4, apical impressed areas more minutely and sparsely punctate, the narrow rims impunctate; tergum 5 quite densely and finely rugoso-punctate across base, with an obscure, obtuse angle on each extreme side; tergum 6 with a corresponding, triangular, apical spine; entire head, thorax and legs pale ochraceous pubescent, with no dark hairs in evidence; basal abdominal tergum pale pubescent anteriorly, with some erect fuscous hairs intermixed among the pale across central and apical portions of disc; terga 2-6 with largely blackish pubescence, rather short and inconspicous on the more basal terga, tergum 2 with an obscure, basal, whitish fascia and obscure, oblique, whitish fascia bordering the apical impressed area on each side; median length of pygidial plate somewhat greater than basal width,

lateral margins strongly carinate, slightly converging apically to the abruptly constricted apical third which is truncate; sterna 7 and 8 and genital armature as shown (fig. 84).

DISTRIBUTION — The New England States, south to Georgia and Texas, July to October.

FLOWER RECORDS—According to LaBerge (1961) *Aster* is the chief source of pollen for *dentiventris*, but species of the following genera are known to be visited: *Bidens, Boltonia, Coreopsis, Chrysopsis, Eupatorium, Helianthus, Isopappus, Lespedeza, Lippia, Polygonum, Solidago, Verbena, Vernonia* and *Veronica*.

Melissodes (Eumelissodes) fumosa LaBerge

Melissodes (Eumelissodes) fumosa LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 486. ♀ ♂.

FEMALE—Length 8-9 mm., breadth of abdomen 3-4 mm.; black, mandibles with a subapical, yellowish maculation; segments of flagellum beyond the 2nd brownish below, piceous above; apical tarsal segments brownish-testaceous, spurs pale yellow; tegulae brownish-testaceous; wings subhyaline, veins testaceous to brownish; cheeks much narrower than eyes; clypeus very slightly protuberant, its median length somewhat less than half distance between eyes below; eyes slightly convergent below; shorter side of segment 2 of flagellum very slightly more than half the length of segment 1; punctures of clypeus close, coarse and deep, narrowly fine and densely crowded toward apical margin, those on labrum considerably finer, very close medially, slightly separated laterally; supraclypeal area impunctate medially, lateral areas of face below antennae quite deeply and finely punctate, punctures slightly separated, face above antennae smooth and shining, with fine, sparse punctures medially, lateral areas practically impunctate; vertex finely and very closely punctate behind ocelli, cheeks somewhat shining, minutely and obscurely punctate; scutum and scutellum somewhat shining between deep and rather coarse punctures, these quite sparse over posterior half of scutum medially, becoming finer and closer anteriorly and along the narrow lateral margins, those on scutellum well separated but hardly sparse; broad lateral area of mesopleura dull and tessellate, punctures hardly evident but becoming somewhat more distinct above, anteriorly and below; posterior face of propodeum dull, the punctures shallow, rather sparse, dorsal area narrow, becoming rather vaguely rugose or reticulate on each extreme side, lateral faces dull and tessellate, punctures fine, rather shallow, and vague; disc of basal abdominal tergum rather coarsely punctate, punctures rather shallow and sparse medially, becoming closer and more distinct laterally where they nearly reach apical margin, the broad median apical area entirely impunctate; terga 2 and 3 quite deeply and distinctly punctate across basal half, apical impressed area with only exceedingly minute, scattered punctures, 3 somewhat more finely and closely punctate than 2; tergum 4 very finely and closely punctate across base, apical margin obscured by tomentum; pygidium elongate-triangular, apex narrowly rounded; vertex with a transverse row of erect and elongate fuscous or blackish hairs, pubescence of head otherwise whitish; scutum and scutellum largely covered with rather copious and erect, blackish pubescence, only the narrow anterior margin pale pubescent, thorax otherwise pale ochraceous to whitish pubescent; legs largely pale pubescent, the fore and mid tibiae with some fuscous pubescence on outer face apically, and basitarsi with some fuscous hairs beneath and anteriorly; scopa pale yellowish, hairs densely plumose; abdominal tergum 1 with rather short pale pubescence anteriorly and laterally, the disc with some short, obscure, subappressed, dark pubescence toward each side, otherwise largely bare; tergum 2 with a basal whitish fascia and a submedian fascia separated by a band of short, thin, suberect, dark pubescence, apical margin largely bare; tergum 3 with a rather broad, subapical whitish fascia, the basal and apical areas with short, suberect, dark pubescence; tergum 4 with a broad, completely apical, whitish tomentose fascia, basal area dark pubescent; and terga 5 and 6 entirely dark pubescent.

MALE—Length 8-8.5 mm., breadth of abdomen 3-3.5 mm.; black, the mandibles somewhat reddened medially, clypeus bright yellow; antennal flagellum brownish-testaceous beneath toward base, apical segments more piceous, and more piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellow; tegulae dull testaceous; wings subhyaline, veins yellowish to testaceous; apical margins of abdominal terga broadly yellowish-hyaline; cheeks much narrower than eyes; clypeus only very slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum extremely short, no longer than pedicel, segment 2 about four times the combined length of segment 1 and pedicel; punctures of clypeus rather fine, close laterally, but rather widely separated along mid-line, labrum with a narrow median impunctate line, punctures on each side fine and close, but

becoming sparse laterally; supraclypeal area shining, with only a few scattered punctures, lateral areas of face on each side very finely and quite closely punctate, upper part of face shining, practically impunctate laterally, but with fine scattered punctures below ocelli; vertex very finely and closely punctate behind ocelli, punctures somewhat more sparse laterally, cheeks shining, punctures minute and obscure except posteriorly; scutum shining between quite coarse and deep punctures, these sparse on posterior half medially, becoming close and somewhat finer laterally and anteriorly, the scutellum with somewhat finer, well separated punctures, but these not sparse; pleura somewhat shining between the rather coarse, shallow punctures, these well separated on the broad lateral area, becoming somewhat closer anteriorly and below; posterior face of propodeum somewhat shining, punctures rather shallow, irregularly scattered and sparse, dorsal area irregularly roughened on each side, lateral faces rather dull, the more posterior punctures rather coarse and close, becoming minute and obscure anteriorly and below; basal abdominal tergum quite deeply and distinctly punctate, the punctures somewhat separated medially, becoming quite close and somewhat finer laterally, and becoming minute toward the rather narrowly impunctate apical margin; terga 2-5 with fine, distinct punctures across basal areas, these well separated on 2, slightly so on 3, and very close on 4 and 5, apical impressed areas invaded only slightly by very minute scattered punctures; tergum 5 with a distinct apical angle on each extreme side, and tergum 6 with a corresponding triangular spine; pubescence copious and entirely pale ochraceous to whitish on head, thorax and legs; basal abdominal tergum largely pale pubescent, copious anteriorly, but with some short suberect dark pubescence across apical half; tergum 2 with a rather thin, basal, whitish fascia, the apical impressed area bordered by a narrow fascia, the area between, as well as the apical impressed area, with short erect dark pubescence; terga 3-5 with narrow whitish fasciae bordering the impressed area, basal areas with rather short but suberect, largely pale pubescence; pygidial plate very slightly longer than its basal width, lateral margins strongly carinate, only very slightly convergent apically, abruptly constricted toward the rather broadly subtruncate apex; sterna 7 and 8 and genital armature similar to those in *agilis* (fig. 84).

DISTRIBUTION — Maryland to Mississippi, west to Kansas and Nebraska, June to October.

FLOWER RECORDS—*Asclepias, Koellia* and *Verbena,* and the following composites: *Aster, Boltonia, Chrysopsis, Eupatorium, Grindelia, Helenium* and *Solidago.* According to LaBerge (1961) there seems to be some preference for *Solidago* as a source of pollen.

Melissodes (Eumelissodes) illata Lovell and Cockerell

Melissodes illata Lovell and Cockerell, 1906. Psyche 13, p. 110. ♀ ♂.
Melissodes (Eumelissodes) illata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 565.

FEMALE—Length 9-12 mm., breadth of abdomen 3.5-4.5 mm.; black, the mandibles yellowish apically, antennal flagellum more piceous beneath, apical tarsal segments somewhat brownish-piceous, spurs pale testaceous; tegulae black to piceous; wings subhyaline basally, becoming very faintly darkened apically, veins brownish to piceous; cheeks somewhat narrower than eyes; clypeus but very slightly protuberant, its median length slightly less than half the distance between eyes below; eyes slightly convergent below; shorter side of segment 2 of flagellum about half the length of segment 1; punctures of clypeus close, quite coarse and deep, those on labrum somewhat finer and closer; supraclypeal area with but a few, scattered, sparse punctures medially, lateral areas of face on each side rather finely, shallowly and quite closely punctate, upper part of face shining, very minutely punctate on each side, median area below ocelli somewhat less shining, punctures rather coarse, deep and quite sparse; vertex very finely and closely punctate behind ocelli, cheeks somewhat shining, punctures minute along eye margin, becoming somewhat coarser and deeper posteriorly; scutum shining, punctures deep and coarse, quite sparse over most of disc, but becoming finer and very close at extreme sides and along anterior margin; punctures of scutellum somewhat finer, rather uniformly close but distinct; pleura somewhat shining, punctures quite coarse and rather close throughout; posterior face of propodeum rather dull, punctures shallow, irregularly scattered and sparse, quite obscure, dorsal area dull, densely tessellate medially, becoming rather vaguely rugose on each side, lateral faces rather dull, punctures fine, shallow and obscure, obsolescent anteriorly and below; basal abdominal tergum with rather coarse and distinct punctures across base, these well separated medially, becoming somewhat closer laterally where they approach the apical margin, the broad median apical area entirely impunctate; terga 2-4 with rather fine but deep, distinct punctures across basal half of each, the broad impuncture apical areas invaded only slightly by exceedingly minute, obscure punctures, the punctures well separated medially on 2, some-

what closer on 3, and fine, almost crowded across base of 4; basal areas of 5 and 6 largely hidden; median length of pygidium very slightly greater than basal width, narrowly elongate-triangular, apex rather narrowly rounded; vertex with a transverse band of erect black hairs, intermixed with the pale at each side between antennae and eyes, face otherwise with whitish pubescence; scutum and scutellum largely covered with rather copious, erect, black pubescence, with some intermixed black hairs on tubercles, scutum very narrowly pale pubescent anteriorly, the pleura and propodeum entirely pale pubescent; coxae, trochanters and femora largely pale pubescent, the fore and mid tibiae with some fuscous, appressed pubescence on outer face apically, and basitarsi dark pubescent in part, the hind tibial scopa pale ochraceous, the hairs quite densely short plumose; basal abdominal tergum with rather elongate, whitish pubescence anteriorly, and some shorter pale hairs along lateral margins, the disc with some very short, suberect, fuscous pubescence toward each side; tergum 2 with a basal pale tomentose fascia and a submedian fascia that is broadly interrupted medially and borders the very broad impressed apical area, discal pubescence extremely short across base, hardly evident, the apical area entirely bare; tergum 3 with a similar but nearly complete whitish fascia, basal area with some short dark pubescence, and apical area with some similar but shorter pubescence evident toward sides; tergum 4 with short, suberect, dark pubescence basally, the apical impressed area largely covered with whitish tomentum, but this rather broadly interrupted medially along the margin; terga 5 and 6 largely dark pubescent but with some elongate pale hairs at extreme sides of 5.

MALE—Length 8-9.5 mm., breadth of abdomen 3-3.5 mm.; black, the labrum with a median yellow maculation, mandibles yellowish apically, clypeus entirely bright yellow; antennal flagellum testaceous beneath, piceous above; apical tarsal segments becoming testaceous, spurs pale yellowish; tegulae dark; wings subhyaline, veins testaceous to piceous; apical margins of abdominal terga becoming somewhat yellowish; cheeks much narrower than eyes; clypeus rather strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum very short, little if any longer than pedicel, segment 2 four or five times longer than combined length of segment 1 and pedicel; punctures of clypeus rather fine, quite obscure on the yellow surface, close laterally, becoming rather well separated medially, those on labrum much finer, quite deep and close; punctures of supraclypeal area rather sparse, becoming quite fine and close toward each extreme side below antennae, face above smooth and shining laterally, punctures minute and sparse, much closer just below ocelli; vertex very finely and closely punctate behind ocelli, punctures somewhat more distinct laterally, cheeks rather coarsely and closely punctate posteriorly, the punctures becoming very minute, rather close along eye margin; scutum and scutellum somewhat shining between quite coarse, deep and distinct punctures, these rather sparse on posterior half of scutum medially, becoming somewhat closer laterally and anteriorly, those on scutellum about equally coarse, well separated but hardly sparse; pleura somewhat shining, punctures rather deep and distinct, rather coarse, slightly separated in large part; posterior face of propodeum dull, punctures shallow and rather vague, irregularly scattered, dorsal area becoming rather coarsely rugoso-striate on each side, lateral faces dull but rather smooth, punctures very shallow becoming obsolescent anteriorly and below; basal abdominal tergum with rather coarse but shallow punctures, these rather well separated medially, becoming somewhat finer and closer at extreme sides where they approach the apical margin, becoming quite sparse and minute across the median apical area, only the narrow apical margin entirely impunctate; terga 2-4 very finely but rather distinctly punctate across base, punctures well separated medially, somewhat closer on 4, apical impressed areas with only exceedingly minute, obscure, scattered punctures evident; tergum 5 punctured much as 4 across base, with a rather obscure and obtuse apical angle at each extreme side; tergum 6 with a corresponding, triangular, apical spine; pubescence of head copious, erect and entirely whitish; scutum and scutellum with abundant, erect, fuscous or blackish pubescence, the anterior third of scutum with pale pubescence, and entire pleura, propodeum and legs pale pubescent; basal abdominal tergum with copious, elongate, pale pubescence over anterior half and laterally, the disc posteriorly with some short, suberect and rather inconspicuous, blackish pubescence; tergum 2 with a rather thin and inconspicuous, basal, whitish fascia, and with a submedian fascia that is interrupted medially and borders the apical impressed area, the disc otherwise with short but erect blackish pubescence; terga 3 and 4 with submedian fasciae that are nearly or quite entire, bordering the apical impressed area, that on 5 more subapical, discs with erect, more elongate, blackish pubescence; median length of pygidial plate slightly greater than basal width, margins carinate, slightly converging apically, with a rather abrupt but slight subapical constriction, the apex rather

rounded or subtruncate; sterna 7 and 8 and genital armature much as in *agilis* (fig. 84).

DISTRIBUTION—Prince Edward Island west to Alberta in Canada, south to North Carolina and Illinois, July to September.

FLOWER RECORDS—LaBerge (1961) lists species of *Aster, Cirsium, Chrysanthemum, Grindelia, Helianthus, Hieracium, Leontodon, Rudbeckia, Solidago, Sonchus* and *Tanacetum.*

Melissodes (Eumelissodes) manipularis Smith

Melissodes manipularis Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 312. ♂.
Melissodes manipularis Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 329.
Melissodes (Eumelissodes) manipularis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 500.

FEMALE—Length 12-13 mm., breadth of abdomen 4.5-5 mm.; black, including labrum and mandibles, the antennal flagella brownish-ferruginous beneath, more piceous above; apical tarsal segments dark, spurs pale yellow; tegulae black; wings subhyaline, veins testaceous to piceous; cheeks considerably narrower than eyes; clypeus only very slightly protuberant, its median length slightly greater than half the distance between eyes below; eyes very slightly convergent below; shorter side of segment 2 of flagellum about half the length of basal segment; punctures of clypeus deep but rather fine, slightly separated, becoming minute and rather densely crowded toward apical margin, those on labrum fine and close medially, becoming slightly separated laterally; supraclypeal area narrowly impunctate along mid-line, becoming rather closely punctate laterally, the lateral areas on each side very finely and rather closely punctate, upper part of face smooth and shining, practically impunctate between eyes and ocelli, median area below ocelli finely but quite distinctly punctate; vertex with very fine, densely crowded punctures behind ocelli, these becoming somewhat more distinct laterally, minute and rather close on cheeks, becoming somewhat more coarse and distinct posteriorly; scutum somewhat shining between rather coarse and deep punctures, these quite sparse over posterior half, becoming rather fine and close laterally and anteriorly, those on scutellum somewhat finer and quite close throughout; pleura rather dull, punctures quite deep and distinct, rather fine and close over lower half, becoming rather abruptly coarser and deeper on upper half; posterior face of propodeum rather dull, punctures fine and quite close but not crowded, dorsal area more coarsely sculptured, becoming rather finely rugosostriate at each extreme side, lateral faces dull, punctures rather obscure, becoming obsolescent anteriorly and below; basal abdominal tergum quite deeply and distinctly punctate across basal half, punctures quite close but not crowded, becoming somewhat finer and close at each extreme side where they nearly reach apical margin, the broad median apical area entirely impunctate; terga 2 and 3 very finely punctate across basal half, punctures well separated but not sparse medially, becoming rather sparse toward each side on 2, somewhat closer on 3, the apical impressed areas with only exceedingly minute, barely visible, scattered, sparse punctures; tergum 4 very finely and densely punctate across basal half, apical area obscured by pubescence; and basal areas of terga 5 and 6 usually hidden; pygidium rather broadly rounded apically, broadly subtriangular; pubescence of head copious and erect, pale ochraceous to whitish, with a few erect, dark hairs between ocelli and on vertex laterally; posterior half of scutum with a conspicuous patch of erect blackish pubescence, and scutellum black pubescent in large part; thorax otherwise pale ochraceous pubescent; coxae, trochanters and femora largely pale pubescent, the front and mid tibiae each with a dense patch of fuscous pubescence on outer surface toward apex, the basitarsi with considerable fuscous pubescence; hind tibial scopa pale ochraceous, hairs quite densely plumose; basal abdominal tergum with rather short but copious and erect, pale pubescence anteriorly and more narrowly along sides, the disc with some very short, suberect, black pubescence at each extreme side; tergum 2 with a basal fascia that is usually hidden, and a submedian whitish fascia bordering the apical impressed area, sometimes slightly interrupted medially, disc with very short, suberect, dark pubescence, apical area with some similar, very obscure pubescence; tergum 3 with a submedian white fascia, and that on 4 covering the apical impressed area in large part, the basal areas rather densely black pubescent; terga 5 and 6 entirely black pubescent.

MALE—Length 11 mm., breadth of abdomen 4.5 mm.; black, the labrum yellow medially, clypeus entirely bright yellow; antennal flagellum brownish-testaceous beneath, more piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae dark; wings subhyaline, veins testaceous to piceous; apical margins of abdominal terga becoming somewhat yellowish-hyaline; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length very slightly greater than distance between eyes below; eyes somewhat convergent

below; basal segment of flagellum extremely short, not much longer than pedicel, segment 2 nearly six times as long as pedicel and segment 1 combined; punctures of clypeus rather fine and obscure, quite close laterally, somewhat separated medially, those on labrum well separated and more distinct; supraclypeal area largely impunctate, the lateral areas of face on each side more finely and closely punctate, upper part of face becoming smooth and shining, punctures very minute laterally, minute in mid-line below ocelli, but rather coarse and deep on each side; vertex with fine densely crowded punctures behind ocelli, these becoming somewhat more distinct laterally, cheeks very minutely punctate along margin of eyes; scutum shining between quite coarse and deep punctures, these quite sparse medially toward the posterior margin, becoming much closer laterally and over anterior half, those on scutellum nearly as coarse but very close, almost contiguous; pleura quite deeply, distinctly and closely punctate throughout; posterior face of propodeum rather finely and closely punctate, dorsal area narrowly impunctate medially, becoming quite coarsely rugoso-punctate on each side, lateral faces dull and rather closely punctate throughout; basal abdominal tergum quite coarsely, deeply and closely punctate, the punctures somewhat more sparse medially, becoming minute toward the narrowly impunctate apical margin; tergum 2 deeply and distinctly but finely and quite closely punctate across basal half, the apical impressed area with only very obscure, minute punctures in evidence; tergum 3 more minutely and rather closely punctate across base; terga 4 and 5 very closely punctate; apical impressed areas of all largely impunctate; tergum 5 with an obscure apical angle on each extreme side, and 6 with a corresponding, triangular, apical spine; pubescence of head copious and erect, entirely pale ochraceous; scutum with a median posterior black pubescent patch, and scutellum quite largely covered with blackish pubescence, thorax otherwise with copious, erect, ochraceous pubescence, that of legs entirely pale; basal abdominal tergum with copious, erect, pale ochraceous pubescence basally and along lateral margins, disc with some suberect black pubescence on each side toward apical margin; tergum 2 with a whitish, rather dense, basal fascia, and a submedian, rather broad fascia that borders the apical impressed area, intermediate area with short, suberect but rather conspicuous, blackish pubescence and a few suberect black hairs on apical area; tergum 3 with a rather narrow fascia bordering the apical impressed area, and with considerable thin, pale tomentum between it and the base, this covered in part with erect, but rather short black hairs, apical impressed area with some short, more decumbant, dark hairs; tergum 4 with a subapical whitish fascia, basal area with elongate black hairs, and apical margin narrowly bare; terga 5 and 6 entirely black pubescent; median length of pygidial plate considerably less than basal width, lateral margins carinate, strongly convergent apically to the abrupt, subapical constriction, the apex rather broadly truncate; sterna 7 and 8 genital armature resembling those in *dentiventris* (fig. 84).

DISTRIBUTION — North Carolina to Florida, in September.

FLOWER RECORDS — *Chrysopsis* and *Kuhnistera.*

Melissodes (Eumelissodes) menuachus Cresson

Melissodes Menuachus Cresson, 1868. Amer. Ent. Soc. Trans. 1, p. 388. ♂.
Melissodes mennacus (!) Uhler, 1877. U. S. Geol. Geog. Survey Bul. 3, p. 783.
Melissodes pallida Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 127. ♀.
Melissodes blakei Cockerell, 1905. Ann. Mag. Nat. Hist. (7) 15, p. 523. ♀.
Melissodes Mizeae Cockerell, 1905. Ann. Mag. Nat. Hist. (7) 15, p. 522. ♀.
Melissodes lavata Cockerell, 1924. Pan-Pacific Ent. 1, p. 56. ♀.
Melissodes mizeae Hicks, 1926. Colo. Univ., Studies 15, p. 225.
Melissodes lavata Cockerell, 1927. Ent. Soc. Amer. Ann. 20. p. 395. ♂.
Melissodes octobris Cockerell, 1934. Ent. News 45, p. 30. ♀.
Melissodes (Eumelissodes) menuachus LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 417.

FEMALE—Length 12-13.5 mm., breadth of abdomen 5-6 mm.; black, the mandibles somewhat reddened apically, segments of flagellum beyond the 2nd brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae dull yellowish-hyaline; wings hyaline, somewhat whitish, veins testaceous to brownish; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; segment 2 of flagellum somewhat longer than broad and slightly longer than half the length of basal segment; punctures of clypeus fine and close, those on labrum rather sparse on each side; supraclypeal area impunctate medially, lateral areas of face below level of antennae very finely and closely punctate, surface becoming shining and nearly impunctate, median area below ocelli quite closely and rather coarsely punctate; vertex behind ocelli with minute,

densely crowded punctures, quite smooth, with minute obscure punctures laterally; cheeks shining, punctures minute and obscure, becoming somewhat more distinct toward posterior margin; scutum shining between quite coarse and deep punctures, these rather sparse medially over posterior half of disc, becoming quite close laterally and anteriorly, those on scutellum somewhat finer, deep, distinct and quite close; punctures of pleura fine and quite close, becoming minute and indistinct posteriorly; posterior face of propodeum dull and densely tessellate, punctures very shallow and obscure, dorsal area densely tessellate medially, becoming rather coarsely reticulate at each extreme side, lateral faces tessellate, punctures rather close but shallow and indefinite, becoming somewhat more distinct but fine anteriorly and below; basal abdominal tergum well punctured across basal two-thirds of disc, punctures shallow but rather coarse and close, nearly reaching apical margin at each extreme side, the broad, median, apical area entirely impunctate and somewhat reddened; basal areas of terga 2-4 minutely and closely punctate, apical impressed areas more or less invaded by exceedingly minute, rather indistinct, close punctures, the apical rims impunctate; pygidium narrowly rounded at apex; pubescence of head and thorax copious but rather short, entirely pale ochraceous, largely pale ochraceous on legs, but front and mid tibiae with a small area of darker pubescence on outer surface apically, and basitarsi with some dark pubescence beneath, hind tibial scopa pale ochraceous, hairs densely plumose; basal abdominal tergum rather copiously pale ochraceous pubescent anteriorly and laterally, discs of remaining terga with very short and thin, entirely pale pubescence, 2 with a basal whitish fascia and a narrow, submedian fascia bordering the apical impressed area, 3 with a submedian, rather broad fascia which is only slightly removed from apical margin, and 4 with a broad dense fascia completely covering the apical impressed area; tergum 5 largely covered with rather short but dense suberect fuscous pubescence, this forming a rather dense apical fimbria, but with some pale hairs on each side.

MALE—Length 11-12 mm., breadth of abdomen 4-5 mm.; black, the clypeus entirely bright yellow, labrum with a median basal yellow maculation, and mandibles yellow maculated at base; antennal flagellum testaceous beneath, more brownish above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae brownish-testaceous; wings hyaline, somewhat whitish, veins testaceous to brownish; apical margins of abdominal terga broadly yellowish-hyaline; cheeks subequal to eyes in width; clypeus but very slightly protuberant, its median length slightly greater than distance between eyes below; eyes slightly convergent below; basal segment of flagellum nearly twice the length of pedicel, segment 2 fully five times as long; punctures of clypeus rather coarse and close, but obscure on the yellow surface, those of labrum somewhat finer, slightly separated; supraclypeal area impunctate medially, lateral areas of face below antennae finely, closely and quite distinctly punctate, surface becoming smooth and shining above, punctures very minute, well separated but distinct, those below ocelli somewhat more coarse and close; vertex with rather fine, crowded punctures behind ocelli and along posterior margin on each side; cheeks smooth and somewhat shining, punctures minute, becoming somewhat more distinct toward posterior margin; scutum shining between coarse, deep punctures, these well separated medially over posterior half of disc, becoming somewhat finer and very close laterally and anteriorly, those on scutellum somewhat finer, slightly separated and evenly distributed; pleura with rather close, coarse and shallow punctures; posterior face of propodeum dull and tessellate, punctures shallow and rather indistinct, somewhat separated, dorsal area dull, densely rugose or reticulate along upper margin, lateral faces somewhat more distinctly and closely punctate; basal abdominal tergum quite deeply punctate over most of disc, punctures somewhat coarser and well separated medially toward the base, becoming finer apically, finer and closer laterally; discs of terga 2-5 quite deeply punctate across base, the punctures somewhat coarser on the more basal terga, slightly but not widely separated on all, surface rather dull, the broad apical impressed areas entirely impunctate and to some degree transparent; tergum 5 with a distinct, acute angle on each extreme side, and tergum 6 with a corresponding, more elongate, acute spine; pubescence of head and thorax and basal abdominal tergum long and copious, entirely whitish to very pale ochraceous, the legs entirely whitish pubescent; discs of abdominal terga with rather elongate but thin, suberect, pale pubescence, 2 with a thin and indefinite, basal, whitish fascia, apical impressed areas of 2-5 rather narrowly fringed with pale ochraceous fasciae, that on 5 nearly apical, and that on 6 completely so; median length of pygidial plate about equal to the basal width, margins rather sharply carinate, slightly converging toward apex, this rather abruptly incurved on each side, apical margin very slightly curved, subtruncate; sterna 7 and 8 and genital armature much as in *agilis* (fig. 84).

DISTRIBUTION—British Columbia to Mexico, east to Wisconsin and Illinois, July to October.

FLOWER RECORDS—According to LaBerge (1961) *Grindelia* and *Solidago* are preferred by *menuachus* as a pollen source, but it has been collected also on species of *Argemone, Aster, Cassia, Chrysopsis, Chrysothamnus, Cleome, Eustoma, Gaillardia, Gutierrezia, Helianthus, Hymenothrix, Medicago, Melilotus, Petalostemum, Polygonum, Rudbeckia, Sidalcea, Verbena, Viguiera* and *Xanthocephalum.*

Melissodes (Eumelissodes) nivea Robertson

Melissodes nivea Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 127. ♀.

Melissodes nivea Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 354. ♂.

Melissodes (Eumelissodes) nivea LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 455.

FEMALE—Length 9.5-11.5 mm., breadth of abdomen 4-5 mm.; black, the apical half of mandibles yellowish in part on outer surface; segments of flagellum beyond the 2nd brownish-ferruginous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae brownish; wings whitish-hyaline, veins pale testaceous to brownish; cheeks only slightly narrower than eyes; clypeus very slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; segment 2 of flagellum somewhat more than half the length of basal segment; punctures of clypeus close, deep and quite coarse, those on labrum much finer but uniformly close; supraclypeal area with sparse, scattered punctures, the face laterally with fine but close and distinct punctures below level of antennae, becoming smooth and shining above between eyes and ocelli, the punctures minute and well separated but distinct, those below ocelli quite coarse and deep; vertex with fine and densely crowded punctures behind ocelli, and along posterior margin laterally; cheeks shining, with minute, well separated punctures, becoming somewhat coarser posteriorly; scutum somewhat shining between deep, distinct and quite coarse punctures, these rather sparse medially on posterior half, becoming finer and closer laterally and anteriorly, those on scutellum somewhat finer, distinct but rather close, uniformly distributed; pleura with quite close, coarse but rather shallow punctures, these becoming very fine and close posteriorly; posterior face of propodeum rather dull, punctures shallow, irregularly scattered, dorsal area dull and densely tessellate medially, becoming rather coarsely rugoso-striate along margin on each side, lateral faces dull in large part, punctures rather close but obscure, becoming more distinct but still close anteriorly and below where surface is more shining; disc of basal abdominal tergum dull, punctures shallow, well separated but rather coarse medially, becoming finer and closer laterally where they nearly reach the apical margin, the broad median apical area entirely impunctate; discs of following terga closely punctate across base, rather coarsely so on 2, more finely so on following terga, apical impressed areas rather well punctured but punctures exceedingly minute and rather widely separated, only the very narrow apical rims entirely impunctate; pygidium narrowly rounded at apex; pubescence of face and cheeks quite copious, entirely white, vertex with fuscous pubescence across top of head, fringed behind with whitish pubescence, and a few dark hairs below level of ocelli on each side; scutum and scutellum largely covered with erect, copious but rather short, fuscous or blackish pubescence, scutum narrowly whitish pubescent across anterior margin, the prothorax, pleura and propodeum entirely whitish pubescent; coxae, trochanters and femora largely whitish pubescent, the fore and mid tibiae pale pubescent except for an apical patch of more fuscous, appressed hairs, the basitarsi with dark hairs beneath; hind tibial scopa whitish, hairs quite densely plumose; basal abdominal tergum largely whitish pubescent, copiously so anteriorly, but with some appressed, blackish pubescence on each side of disc; tergum 2 with a basal white fascia, largely obscured by the preceeding tergum, and a median, narrow, whitish fascia bordering the basal margin of the impressed area, disc otherwise covered with very short, suberect, fuscous pubescence, the apical area only very thinly pale pubescent; tergum 3 with a rather narrow fascia bordering the impressed area, disc basally with thin, whitish tomentum and a few more elongate, erect hairs, the shorter of these dark, the long erect hairs whitish, apical margin very thinly whitish pubescent; tergum 4 dark pubescent across basal area, the apical area completely covered with dense whitish tomentum; terga 5 and 6 entirely dark pubescent except for some pale hairs laterally.

MALE—Length 9 mm., breadth of abdomen 3-3.5 mm.; black, the clypeus entirely bright yellow, and labrum with a large basal yellow maculation, dark laterally and apically; antennal flagellum brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae brownish; wings whitish-hyaline, veins yellowish to testaceous; apical margins of abdominal terga broadly yellowish-hyaline

and transparent; cheeks nearly as broad as eyes; clypeus only very slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum extremely short, somewhat shorter than pedicel, segment 2 about five times as long as segment 1 and pedicel combined; punctures of clypeus rather fine and close laterally, somewhat more separated medially, rather obscure on the yellow surface, those on labrum somewhat more distinct, slightly separated on each side; supraclypeal area impunctate medially, lateral areas of face below level of antennae rather dull, finely and rather closely punctate becoming minute and less distinct above where the surface is shining between eyes and ocelli, the more median punctures below ocelli rather coarse and close; vertex very finely and densely punctate behind ocelli, and more narrowly along margin laterally; cheeks somewhat shining, punctures minute, but becoming rather deep and distinct toward posterior margin; scutum shining, punctures rather deep and distinct, becoming very sparse and rather fine over posterior half, rather close at extreme sides and anteriorly, those on scutellum rather fine and quite sparse; punctures of pleura rather coarse and deep, somewhat separated, becoming finer and closer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures shallow and irregular, rather sparse on each side of mid-line, dorsal area dull, becoming irregularly and rather coarsely reticulate on each side, lateral faces dull, rather closely punctate posteriorly, punctures becoming rather sparse, shallow and obscure anteriorly and below; punctures of abdominal terga quite deep and distinct, rather coarse and close across base of the basal tergum, becoming finer toward apical margin, only the narrow rim entirely impunctate; punctures rather well separated on discs of terga 2 and 3, closer and finer on 4, and much closer on 5, rather evenly distributed on each, apical impressed areas largely impunctate; tergum 5 with a short but acute angle on each extreme side, and 6 with a corresponding more elongate and slender spine; pubescence quite copious and elongate, entirely white on head, thorax, legs and basal abdominal tergum, only the basitarsi with some more yellowish pubescence beneath; discs of abdominal terga 2-6 with thin but rather copious and erect, whitish pubescence that does not obscure the surface, apical impressed areas fringed basally with narrow whitish fasciae, these more nearly apical in position on the more apical terga, and tergum 2 with a basal, rather thin fascia which is usually covered by the preceding plate; median length of pygidial plate somewhat greater than basal width, margins carinate, slightly convergent apically, becoming rather abruptly narrowed toward the narrowly truncate apex; sterna 7 and 8 and genital armature resembling those in *agilis* (fig. 84).

DISTRIBUTION — New York to North Carolina and Mississippi, west to Arkansas, July to October.

FLOWER RECORDS—LaBerge (1961) lists species of *Aster, Bidens, Boltonia, Chrysopsis, Gerardia, Helenium, Helianthus, Lacinaria, Lepachys, Liatris, Prionopsis, Solidago* and *Vernonia.*

Melissodes (Eumelissodes) pilleata LaBerge

Melissodes (Eumelissodes) pilleata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 459. ♀ ♂.

FEMALE—Length 11-12 mm., breadth of abdomen 4-5 mm.; black, the antennal flagellum somewhat more piceous beneath, apical tarsal segments somewhat more piceous, spurs dull testaceous; tegulae piceous; wings very lightly infuscated, veins piceous; cheeks somewhat broader than eyes; clypeus very slightly protuberant, its median length about half the distance between eyes below; eyes subparallel; basal segment of flagellum nearly twice the length of segment 2; clypeus closely, deeply and rather coarsely punctate, the punctures becoming very fine and densely crowded toward apical margin, those on labrum much finer, closely crowded medially, becoming quite sparse laterally; supraclypeal area somewhat shining and very sparsely punctate, lateral areas of face below level of antennae very finely and quite closely punctate, becoming more sparsely and minutely punctate above, the surface shining between eyes and ocelli, the median punctures below ocelli much coarser and deeper; vertex finely and densely punctate behind ocelli, more widely separated laterally; cheeks quite smooth, punctures minute, becoming somewhat more coarse and distinct along posterior margin; scutum shining between quite coarse and deep punctures, these sparse medially over apical half of disc, becoming somewhat finer and much closer laterally and anteriorly, those on scutellum slightly finer, quite close and uniform; punctures of pleura deep, rather coarse and quite close, becoming much finer posteriorly above mid coxae; posterior face of propodeum dull, punctures shallow and rather close, dorsal area dull, rather coarsely rugose or reticulate on each side of mid-line along upper margin, lateral faces dull and obscurely punctate posteriorly, the punctures becoming finer and more obscure anteriorly and below; basal two-

thirds of disc of basal abdominal tergum dull, rather shallowly but closely punctate, punctures becoming finer and closer laterally where they nearly reach the apical margin, the broad, median, apical area impunctate; discs of the following terga very finely punctate across basal area, punctures well separated on tergum 2, quite close on 3 and crowded on 4, apical impressed areas nearly impunctate, with only vague and extremely minute punctures at all visible; pygidium rather narrowly rounded apically; vertex with a transverse line of long black hairs, head otherwise with rather copious, short, whitish pubescence; scutum and scutellum largely covered with erect but rather short, fuscous or blackish pubescence, only the narrow anterior margin of scutum white pubescent; pleura and propodeum entirely whitish pubescent; legs largely pale pubescent, but fore and mid tibiae with some fuscous, appressed pubescence on outer face near apex, and basitarsi with dark hairs beneath; hind tibial scopa whitish or pale ochraceous, the hairs quite densely plumose; basal abdominal tergum with some short, rather inconspicuous, blackish pubescence on each side of disc, but otherwise with rather short, copious pale pubescence medially, anteriorly and at extreme sides; discs of the following terga largely covered with short, suberect but rather inconspicous, black pubescence, the apical impressed areas only thinly pubescent; tergum 2 with a basal white fascia, usually obscured by the preceding tergum; terga 2-4 with submedian, white fasciae that fringe the impressed apical areas, more or less interrupted medially on 2, that on 4 more nearly subapical in position; terga 5 and 6 entirely blackish pubescent.

MALE—Length 9-11 mm., breadth of abdomen 3.5-4 mm.; black, the clypeus yellowish-white, labrum with a large, median, ivory maculation, and mandibles ivory maculated at base; antennal flagellum testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae piceous; wings very lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga becoming narrowly yellowish apically; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length considerably greater than half the distance between eyes below; eyes slightly convergent below; basal segment of flagellum very short, no longer than pedicel, segment 2 nearly six times as long as segment 1 and pedicel combined; punctures of clypeus rather coarse and close laterally, becoming slightly separated medially, obscure on the whitish surface, those on labrum somewhat finer, slightly separated laterally; supraclypeal area shining, with only a very few, widely scattered punctures, lateral areas of face below level of antennae closely and finely punctate, punctures becoming minute above antennae where the surface is shining and between eyes and ocelli, the more median punctures below ocelli quite coarse and deep; vertex finely and rather densely punctate behind ocelli, the punctures more distinct on each side; cheeks somewhat shining beneath the pubescence, punctures minute, becoming more distinct and deep toward the posterior margin; scutum shining between deep and rather coarse punctures, these quite sparse over posterior half medially, becoming finer and closer laterally and anteriorly, those on scutellum somewhat finer and quite sparse, the surface shining; punctures of pleura quite coarse and deep, rather well separated, becoming rather minute and closer posteriorly above mid coxae; posterior face of propodeum rather dull, punctures rather coarse, not widely separated, dorsal area becoming very dull, quite densely reticulate along upper margin, lateral faces somewhat more closely and finely punctate, the punctures becoming obsolescent anteriorly and below; discs of abdominal terga with quite deep and distinct punctures, those on basal tergum well separated medially and rather coarse, evenly distributed, becoming minute and somewhat more sparse toward apical margin which is very narrowly impunctate, those on the following terga becoming progressively finer and closer, apical impressed areas largely impunctate but invaded to a slight degree by extremely minute, widely scattered punctures; terga 5 and 6 closely punctate basally, 5 with a slight angle on each extreme side, and 6 with a corresponding, more elongate and robust spine; vertex with a few, erect and elongate dark hairs, but head otherwise quite densely long white pubescent; scutum and scutellum with copious, erect, fuscous pubescence, only the narrow anterior margin of scutum with pale pubescence; pleura, propodeum and legs entirely whitish pubescent; basal abdominal tergum with copious, long, erect, whitish pubescence across basal area, the narrow apical area with elongate, suberect, fuscous pubescence; discs of the following terga with erect, blackish to fuscous pubescence, more abundant on the basal area, sparse on the impressed apical areas, these fringed basally with narrow white fasciae, and tergum 2 with a basal white fascia which is usually covered in part by the preceding tergum; tergum 6 entirely fuscous pubescent; median length of pygidial plate about equal to basal width, margins strongly carinate and quite strongly convergent apically to the constricted and rather broadly truncate apex; sterna 7 and 8 and genital armature much as in *agilis* (fig. 84).

DISTRIBUTION—North Carolina, September and October.

FLOWER RECORDS — *Aster, Chrysopsis, Gerardia, Haplopappus, Kuhnistera* and *Liatris.*

Melissodes (Eumelissodes) rustica (Say)

(Fig. 85)

Macrocera rustica Say, 1837. Boston Jour. Nat. Hist. 1, p. 406. ♂ ♀.
Melissodes rustica Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 309.
Melissodes assimilis Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 114.
Melissodes ambigua Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 116.
Melissodes festinata Provancher, 1888. Addit. Pet. Faun. Canada, Hym. 2, p. 300.
Melissodes simillima Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 355.
Melissodes asteris Robertson, 1914. Ent. News 25, p. 70.
Melissodes (Eumelissodes) rustica LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 543.

FEMALE—Length 9.5-11.5 mm., breadth of abdomen 4-4.5 mm.; black, the flagellum reddish-piceous beneath, black above; apical tarsal segments becoming brownish, spurs pale yellowish; tegulae piceous; wings subhyaline, veins testaceous to piceous; cheeks slightly broader than eyes; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below (fig. 85); basal segment of flagellum about twice the length of segment 2; punctures of clypeus contiguous, rather coarse and deep, becoming very fine and densely crowded toward apical margin, those on labrum finer and more distinctly separated; supraclypeal area impunctate medially, becoming densely crowded on each side, lateral areas of face below antennae, rather finely punctate, the punctures well separated, becoming minute and quite sparse above between eyes and ocelli where the surface is shining, the more median punctures below ocelli much more coarse and distinct; vertex finely and densely punctate behind ocelli, somewhat more finely so on each side; cheeks shining, punctures exceedingly minute, becoming somewhat more distinct and deep posteriorly; scutum shining between quite coarse and deep punctures, these rather sparse in median area posteriorly, becoming considerably closer laterally and anteriorly, those on scutellum much finer and quite close but not crowded; punctures of pleura quite deep, close and rather coarse; posterior face of propodeum dull, densely tessellate, the punctures rather coarse and close, but very shallow and obscure, dorsal area quite coarsely reticulate, becoming more striate at each extreme side, lateral faces dull and densely tessellate, punctures quite close but obscure; disc of basal abdominal tergum dull and tessellate across basal two-thirds, with rather coarse but shallow, somewhat separated punctures, these becoming somewhat finer and closer laterally where they nearly reach apical margin, the broad, median, apical area entirely impunctate; tergum 2 basally very finely and rather irregularly punctate, the punctures rather widely separated in general, apical impressed area largely impunctate except toward extreme sides; basal areas of terga 3-5 very finely and closely punctate, becoming almost rugose on the more apical terga, apical impressed areas with exceedingly minute punctures, those on 4 rather close; pygidium elongate-triangular, apex narrowly rounded; pubescence variable, largely black on the head, thorax and abdomen in the dark forms, with light hairs only around tubercles, on propodeum, and on basal abdominal tergum, scopa pale yellowish, the abdominal fasciae fuscous and thus obscure; in the lighter forms there is considerable pale pubescence across front of face and on cheeks laterally and below, the vertex with long fuscous pubescence and some fuscous hairs bordering eyes above; the scutum and scutellum are in large part fuscous pubescent, the scutum being pale pubescent over anterior third, and the pleura above, and entire propodeum pale ochraceous pubescent; the legs are largely black pubescent, but the hind tibial scopa is pale yellow, the hairs densely plumose; the discal pubescence of the abdominal terga is very short, suberect, largely blackish; tergum 2 with a basal whitish fascia, and the apical impressed areas of 2-4 fringed with narrow, whitish fasciae that are slightly interrupted medially; terga 5 and 6 are entirely fuscous pubescent.

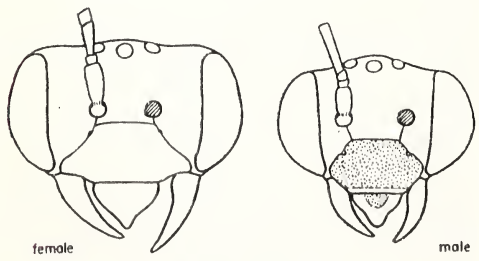


Figure 85
Facial view of head in both sexes of *M. (Eumelissodes) rustica.*

MALE—Length 8-9 mm., breadth of abdo-

men 3-3.5 mm.; black, the clypeus bright yellow, labrum with a basal, median, yellow maculation and mandibles rather obscurely testaceous toward the apex, usually entirely black at base; antennal flagellum testaceous toward apex, usually entirely black at base; antennal flagellum testaceous beneath, piceous above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae dark, brownish-piceous; wings rather whitish-hyaline, veins testaceous to brownish; cheeks much narrower than eyes; clypeus slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below (fig. 85); basal segment of flagellum slightly longer than pedicel, segment 2 four or five times this length; punctures of clypeus quite close and rather coarse laterally, slightly more distinct medially, but obscure on the yellow surface, those on labrum somewhat deeper and more distinct; supraclypeal area largely impunctate, lateral areas of face below level of antennae distinctly but quite finely and closely punctate, becoming minute and obscure above where the surface is shining between eyes and ocelli, median punctures below ocelli considerably coarser and more distinct; vertex very finely and densely punctate behind ocelli, punctures somewhat more distinct on each side; cheeks shining, punctures exceedingly minute and obscure, but becoming somewhat more deep and distinct toward posterior margin; scutum shining between coarse, deep punctures, these rather sparse over posterior half of disc, becoming finer and closer laterally and anteriorly, those on scutellum slightly finer and rather sparse, the surface shining; pleura quite coarsely, deeply and rather closely punctate; posterior face of propodeum dull and tessellate, punctures shallow, irregularly scattered and obscure, dorsal area dull, becoming rather densely rugose along upper margin, more striate at each extreme side, lateral faces dull, punctures somewhat closer and more distinct; basal abdominal tergum rather dull, punctures rather coarse, shallow and widely separated toward base medially, becoming finer and closer laterally where they nearly reach apical margin, the more apical punctures minute and more widely separated, only the very narrow apical rim entirely impunctate; basal areas of terga 2 and 3 with rather fine, well separated punctures, apical impressed areas practically impunctate, with only a very few, minute, scattered punctures just beyond the fasciae; terga 4 and 5 basally very finely and quite densely punctate, 5 with a quite distinct angle on each side, tergum 6 with a corresponding, more elongate, subtriangular spine; pubescence copious and erect, largely pale yellowish or whitish on head, thorax, basal abdominal tergum and legs; discs of terga 2-6 with short, rather thin, copious, pale pubescence, which does not obscure the surface, some of the more erect hairs appearing darker; tergum 2 with a rather thin, basal, white fascia and a submedian narrow fascia which fringes the apical impressed area; terga 3 and 4 white fasciate along margin of the impressed area, the apical portion of this area bare and impunctate; terga 5 and 6 largely dark pubescent, but 5 subfasciate; median length of pygidial plate about equal to the basal width, margins carinate, rather strongly convergent apically to the rather abruptly constricted and truncate apex; sternum 7 and genital armature resembling those in *agilis* (fig. 84), but sternum 8 narrower at apex.

DISTRIBUTION—Nova Scotia to Georgia and Mississippi, west to Idaho, Arizona and Mexico, May to November.

FLOWER RECORDS—LaBerge (1961) states that *rustica* is oligolectic on Compositae, preferring species of *Solidago* and *Aster* over most of its range. The complete list of plants visited includes also species of *Abutilon, Amphiachyris, Aplopappus, Asclepias, Baccharis, Bidens, Centaurea, Chrysopsis, Cirsium, Cleome, Coreopsis, Cosmos, Epilobium, Gaillardia, Grindelia, Helenium, Helianthus, Heliopsis, Hieracium, Lycopus, Marrubium, Melilotus, Mentha, Physostegia, Polymentha, Ratibida, Rudbeckia, Silphium, Spiraea, Verbena, Verbesina* and *Vernonia.*

This is a very variable species with respect to the color of pubescence in the female, and in the male also, but to a lesser degree. The variations have some correlation with distribution, with populations in the Eastern United States generally darker than those in the West. A discussion and analysis of this variation is included in Part 3 of LaBerge's Revision (1961), pp. 546-552.

Melissodes (Eumelissodes) subillata LaBerge

Melissodes (Eumelissodes) subillata LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 568. ♀ ♂.

FEMALE—Length 9.5-12 mm., breadth of abdomen 3.5-4.5 mm.; black, the mandibles with a yellowish apical maculation, flagellum reddish-piceous beneath; apical tarsal segments becoming brownish-testaceous, spurs pale yellow; tegulae dark; wings subhyaline, veins brownish to piceous; cheeks considerably narrower than eyes; clypeus very slightly protuberant its median length about half the

distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum about half the length of basal segment; punctures of clypeus close and rather coarse laterally, slightly separated medially, becoming densely crowded and fine along apical margin, close and somewhat finer on labrum; supraclypeal area rather sparsely punctate, face laterally with fine and rather close punctures below level of antennae, surface above shining, punctures very minute and quite sparse between eyes and ocelli, but median punctures below ocelli relatively coarse and close; vertex finely and densely punctate behind ocelli; cheeks somewhat shining, punctures minute and slightly separated, becoming somewhat coarser posteriorly; scutum shining between rather coarse and deep punctures, these well separated posteriorly, becoming somewhat finer and quite close laterally and anteriorly, those on scutellum about equally coarse, only slightly separated; pleura with deep and rather coarse punctures, these slightly separated in median area of lateral surface, becoming much finer and closer posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, rather sparse and irregular, dorsal area dull, becoming rather coarsely reticulate along upper margin, lateral faces dull, punctures very shallow and vague but quite close; disc of basal abdominal tergum rather dull, punctures shallow and vague, well separated across basal area, somewhat finer and closer at extreme sides where they nearly reach apical margin, the broad median apical area entirely impunctate; basal areas of terga 2 and 3 very minutely punctate, sparsely so on 2, apical impressed areas entirely impunctate; tergum 4 minutely and much more closely punctate across base; pygidium elongate-triangular, its median length considerably greater than basal width, narrowly rounded at apex; vertex with much erect fuscous or blackish pubescence, fringed posteriorly with long white hairs, head otherwise whitish pubescent; scutum and scutellum largely short, fuscous pubescent, scutum with only a few pale hairs along anterior margin, and tubercles with intermixed fuscous hairs among the pale, the pleura and propodeum entirely whitish pubescent; legs largely pale pubescent, but fore and mid tibiae with a small apical patch of brownish appressed pubescence, and basitarsi with some dark hairs beneath; hind tibial scopa whitish, hairs rather densely plumose; basal abdominal tergum rather narrowly pale pubescent laterally and basally, disc with some short, suberect, blackish pubescence visible toward the sides; discs of terga 2-4 with short, suberect, blackish pubescence, more elongate and erect on 4, the apical impressed areas with only suberect hairs visible toward sides, tergum 2 with a rather broad basal, whitish fascia and a narrow, submedian, somewhat oblique fascia, fringing the impressed apical area and rather widely interrupted medially; apical areas of terga 2 and 3 also fringed with a narrow whitish fascia, entire or narrowly interrupted, that on 4 quite broad laterally, more or less separated from rim of tergum medially; terga 5 and 6 largely dark pubescent, with a few elongate, pale hairs laterally.

MALE—Length 9.5-12 mm., breadth of abdomen 3-4 mm.; black, the clypeus entirely bright yellow, labrum often with a median, basal, yellow maculation, and mandibles with a subapical, more testaceous maculation; flagellum brownish-testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae piceous; wings subhyaline, veins testaceous to brownish; abdominal terga often becoming yellowish along apical rims; cheeks slightly narrower than eyes; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; shorter side of basal segment of flagellum slightly longer than pedicel, segment 2 four or five times the length of segment 1; clypeus quite deeply and rather coarsely punctate, the punctures only very slightly separated, obscure on the yellow surface, those on labrum somewhat finer but deeper, more distinct and quite close; supraclypeal area very finely and sparsely punctate, lateral areas of face below level of antennae finely and quite closely punctate, surface above shining, punctures between eyes and ocelli very minute and sparse, more coarse and distinct medially, below ocelli; vertex very finely and densely punctate behind ocelli, punctures somewhat more distinct laterally; cheeks rather smooth, somewhat shining, punctures exceedingly minute and vague, scutum shining, punctures deep and rather coarse, quite sparse over posterior half, becoming finer and closer laterally and anteriorly, scutellum somewhat more finely punctate, the punctures well separated throughout; pleura quite coarsely, deeply and closely punctate throughout, the punctures distinctly but not widely separated; posterior face of propodeum dull and tessellate, punctures rather shallow and sparse, dorsal area rather coarsely reticulate along upper margin, lateral faces quite closely but rather finely punctate posteriorly, the punctures becoming obsolescent anteriorly and below; basal abdominal tergum with rather fine, well separated, shallow punctures across basal half of disc, becoming finer and closer at extreme sides where they nearly reach apical margin, the broad, median, apical area nearly impunctate; basal areas of terga 2-5 very finely punctate, the punctures rather sparse on 2

and 3, closer on 4, and quite close on 5, apical impressed areas largely impunctate; tergum 5 with a short, somewhat obtuse angle on each extreme side, and tergum 6 with a corresponding, triangular, apical spine; vertex with considerable erect fuscous pubescence between tops of eyes, but fringed posteriorly with whitish pubescence, head otherwise with quite copious, elongate, whitish pubescence; scutum and scutellum covered in large part with elongate, fuscous hairs, the anterior third or fourth of scutum with erect pale pubescence, pleura, propodeum and legs entirely whitish pubescent; basal abdominal tergum largely whitish pubescent, quite elongate and copious basally, disc with some suberect, inconspicuous, dark pubescence on each side; discs of terga 2-5 with short, suberect, fuscous or blackish pubescence across the basal areas, impressed apical areas with some similar but shorter and more decumbent pubescence; tergum 2 with a rather broad, basal, white fascia and a medially interrupted fascia fringing the apical impressed area; terga 3 and 4 with narrow, entire, whitish fasciae bordering the impressed area, 5 with a somewhat less conspicuous whitish fascia, 6 entirely dark pubescent; median length of pygidial plate somewhat greater than basal width, margins carinate, nearly parallel, but rather abruptly constricted toward the broadly truncate apex, sterna 7 and 8 and genital armature resembling those in *agilis* (fig. 84).

DISTRIBUTION—Quebec to Saskatchewan in Canada, south to North Carolina and Illinois, June to September.

FLOWER RECORDS — Species of the following plant genera are listed by LaBerge (1961): *Aster, Chrysanthemum, Cichorum, Cirsium, Coreopsis, Echinacea, Epilobium, Eupatorium, Gaillardia, Helianthus, Hieracium, Lactuca, Petalostemum, Platycodon, Psoralea, Ratibida, Rudbeckia, Solidago, Sonchus, Teucrium* and *Vernonia.*

Melissodes (Eumelissodes) tincta LaBerge

Melissodes (Eumelissodes) tincta LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 493. ♀ ♂.

FEMALE—Length 9.5-11 mm., breadth of abdomen 4-4.5 mm.; black, mandibles with a more or less conspicuous, apical, testaceous maculation; antennal flagellum piceous beneath; apical tarsal segments somewhat brownish, spurs pale yellowish; tegulae somewhat brownish; wings whitish-hyaline, veins testaceous to piceous; cheeks nearly as broad as eyes; clypeus slightly protuberant, its median length half the distance between eyes below; eyes slightly convergent below; segment 2 of flagellum slightly more than half the length of basal segment; punctures of clypeus quite coarse, close and deep, those on labrum close but somewhat finer; supraclypeal area sparsely punctate medially, lateral areas of face below level of antennae finely and rather closely punctate, becoming minute and rather sparse above on shining surface between eyes and ocelli, quite coarse and sparse medially, below ocelli; vertex finely and densely punctate behind ocelli, punctures somewhat more distinct laterally; cheeks somewhat shining; punctures minute along eye margin, becoming deeper and more distinct posteriorly; scutum somewhat shining between coarse and deep punctures, these well separated but not sparse over posterior half of disc, becoming much closer and somewhat finer laterally and anteriorly, those on scutellum finer and quite close; pleura with rather coarse but shallow, well separated punctures, becoming much finer and closer posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures rather shallow, somewhat sparse, dorsal area becoming rather coarsely reticulate along upper margin, lateral faces dull, quite closely and finely punctate; basal abdominal tergum rather dull across basal half, with shallow, somewhat separated punctures, these becoming much closer laterally where they nearly reach the apical margin, the broad median apical area impunctate; basal areas of terga 2-4 quite deeply and distinctly but rather finely and closely punctate, those on 4 almost crowded, apical impressed areas very minutely but rather closely punctate nearly to the rim; median length of pygidium about equal to basal width, subtriangular, apex rather narrowly rounded; vertex with conspicuous, erect, fuscous pubescence across top of head, with some intermixed fuscous hairs between ocelli and antennae, and along margin of eyes above, face with a few intermixed dark hairs, otherwise whitish pubescent, quite copious and elongate; scutum and scutellum with conspicuous, erect, fuscous or blackish pubescence, the scutum narrowly white pubescent across anterior margin, the pleura and propodeum entirely whitish or pale ochraceous pubescent; the more basal segments of the legs pale pubescent, the fore and mid tibiae more fuscous pubescent along outer face, basitarsi with generally dark pubescence, hind tibial scopa whitish, hairs quite densely plumose; basal abdominal tergum with abundant, copious, long and erect, pale pubescence basally and with some short pale pubescence along lateral margins, disc with some short, suberect, fuscous pubescence at each side; discs of terga 2-5 largely covered with very short, erect or suberect, fuscous pubes-

cence, 2 with a rather narrow, basal, white fascia, and submedian, slightly interrupted fascia that fringes the apical impressed area; terga 3 and 4 with somewhat broader, entire, whitish fasciae, that on 3 submedian, more nearly apical on 4, the latter separated from the rim medially by a fuscous tomentose area; terga 5 and 6 entirely fuscous or blackish pubescent except for a few pale hairs at extreme sides.

MALE—Length 9.5-10 mm., breadth of abdomen 3.5-4 mm.; black, including labrum and base of mandibles, the latter with an apical yellowish maculation, and apical half of clypeus bright yellow, basal half or more black; antennal flagellum testaceous beneath, piceous above; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish; tegulae brownish-testaceous; wings whitish-hyaline, veins yellowish to brownish; apical margins of abdominal terga becoming more or less yellowish-hyaline and transparent toward rims; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum little if any longer than pedicel, segment 2 nearly five times as long as segment 1 and pedicel combined; punctures of clypeus fine and close laterally, becoming somewhat coarser and more distinct medially, quite obscure on the yellow maculated area, those on labrum fine, distinct and close; supraclypeal area very sparsely punctate medially, lateral areas of face below level of antennae finely and quite closely punctate, becoming very minute and obscure above on the shining surface between eyes and ocelli, much more coarse and distinct and rather close medially, below ocelli; vertex finely and densely punctate behind ocelli; cheeks with minute punctures along margin of eyes, these becoming quite coarse and deep posteriorly, scutum somewhat shining between coarse and deep punctures, these rather sparse in a limited posterior area, becoming very much finer and closer laterally and somewhat closer and rather coarse anteriorly, those on scutellum not quite so coarse, well separated but hardly sparse; punctures of pleura quite coarse, close and deep, becoming much finer and closer posteriorly above mid coxae; posterior face of propodeum rather dull and tessellate, punctures rather shallow but quite close, becoming somewhat sparser laterally, dorsal area quite coarsely rugose or reticulate along upper margin, lateral faces dull and densely tessellate, punctures shallow and irregular, becoming obsolescent below; basal abdominal tergum quite coarsely and deeply punctate, the punctures distinctly but not widely separated medially, becoming much finer and somewhat more sparse toward the rim, quite close at extreme sides where they nearly reach the apical margin; terga 2-4 quite deeply but rather finely punctate across basal area, the punctures rather sparse on 2, somewhat closer but not crowded on 3 and 4, apical impressed area invaded only slightly by very minute and rather sparse punctures; tergum 5 quite finely and densely rugoso-punctate, obscurely angulate at each extreme side, tergum 6 with a corresponding triangular, apical spine on each side; head with copious, long and erect, whitish to pale ochraceous pubescence, sometimes with a few dark hairs behind ocelli and across vertex; scutum and scutellum with rather abundant, erect, dark pubescence, anterior margin of scutum covered with pale ochraceous pubescence, pleura and propodeum entirely pale ochraceous pubescent; pubescence of legs entirely whitish; basal abdominal tergum with copious, long and erect pubescence basally and more narrowly along lateral margins, disc with some shorter, suberect, fuscous pubescence; terga 2-5 with short, suberect, blackish or fuscous pubescence on basal area, sometimes with a small amount of suberect black pubescence on the apical areas; tergum 2 with a rather narrow basal yellowish-white fascia, and a submedian fascia that fringes the apical impressed area basally, this slightly interrupted medially; apical impressed areas of terga 3 and 4 also narrowly fasciate at base, 5 with a more nearly apical fascia; median length of pygidial plate about equal to basal width, margins carinate and slightly convergent to the rather abruptly constricted apex which is truncate; sterna 7 and 8 and genital armature, resembling those in *agilis* (fig. 84).

DISTRIBUTION—Minnesota and Michigan to North Carolina, Texas and Florida, August to December.

FLOWER RECORDS—LaBerge (1961) states that *tincta* is an oligolege of composites, chiefly species of *Chrysopsis* and *Aster*. He records it also on *Helianthus* and *Verbesina*.

Melissodes (Eumelissodes) trinodis Robertson

Melissodes trinodis Robertson, 1901. Canad. Ent. 33, p. 231. ♀ ♂.
Melissodes trinodis Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, p. 164. (biology)
Melissodes (Eumelissodes) trinodis LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 393.

FEMALE—Length 11-12 mm., breadth of abdomen 4.5-5 mm.; black, the mandibles more or less yellow apically; segments of flagellum beyond the 2nd reddish-piceous below, black

above; apical tarsal segments more brownish, the spurs pale yellow; tegulae brownish-testaceous; wings whitish-hyaline, veins testaceous to piceous; cheeks about as broad as eyes; clypeus but very slightly protuberant, its median length about half the distance between eyes below; eyes slightly converging below; segment 2 of flagellum slightly more than half the length of segment 1; clypeus very closely and distinctly punctate, punctures rather fine, those on labrum fully as coarse and nearly as close; supraclypeal area impunctate medially, lateral areas of face below level of antennae very finely and closely punctate, becoming minute but still rather close on shining surface above between eyes and ocelli, median area below ocelli more deeply and distinctly but quite closely punctate; vertex very finely and densely punctate behind ocelli, lateral punctures more distinct; cheeks somewhat shining, rather closely punctate, the punctures minute and indistinct along eye margin, becoming rather coarse and deep posteriorly; punctures of scutum quite coarse and deep, rather uniformly close, only slightly separated in center of disc posteriorly, those on scutellum about equally coarse and close; punctures of pleura somewhat finer and more shallow than those on scutum, slightly separated, becoming somewhat finer and more obscure posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures rather shallow and well separated, dorsal area becoming rather coarsely reticulate on each side along the upper margin, lateral faces dull, punctures rather close and fine; basal abdominal tergum rather closely punctate across basal half of disc, the punctures sometimes shallow and obscure, becoming closer at extreme sides where they nearly reach apical margin, the broad, median, apical area impunctate; terga 2-4 finely punctate across basal areas, punctures well separated but not sparse on 2, becoming finer on 3, and almost crowded on 4, apical areas with scattered, exceedingly minute and rather sparse punctures; median length of pygidium about equal to basal width, subtriangular, with narrowly rounded apex; entire head and thorax with copious, quite dense, bright ochraceous or fulvous pubescence, with only a few inconspicuous dark hairs at all evident on scutellum and on scutum posteriorly; legs pale pubescent basally, but fore and mid tibiae with more or less fuscous pubescence on outer surface, basitarsi with dark brownish pubescence, hind tibial scopa yellowish, the hairs quite densely plumose; basal abdominal tergum with a small amount of short, subappressed, fuscous pubescence on each side of disc, otherwise with rather copious ochraceous pubescence basally and along lateral margins; discs of terga 2-5 with rather sparse, short, suberect, dark pubescence, this more sparse on the apical impressed areas; tergum 2 with a rather broad, basal, yellowish fascia, and 2 and 3 with submedian fasciae that fringe the apical impressed areas, that on 3 somewhat broader; apical area of tergum 4 largely covered with yellowish or whitish tomentum, this rather narrowly interrupted medially along the apical margin; terga 5 and 6 dark pubescent except for some lateral pale hairs.

MALE—Length 9-11 mm., breadth of abdomen 3.5 mm.; black, the clypeus entirely bright yellow, labrum with a basal, median, yellow maculation, and mandibles with subapical, more testaceous maculations; antennal flagellum brownish-testaceous beneath, piceous above; apical tarsal segments brownish-testaceous, spurs pale yellowish; tegulae rather dark anteriorly, becoming somewhat more yellowish-hyaline posteriorly; wings whitish-hyaline, veins yellowish to testaceous; margins of abdominal terga more or less yellowish; cheeks somewhat narrower than eyes; clypeus slightly protuberant, its median length somewhat greater than distance between eyes below; eyes quite strongly convergent below; basal segment of flagellum about equal to pedicel in length, segment 2 four or five times longer than segment 1 and pedicel combined; punctures of clypeus quite close laterally, becoming somewhat separated medially, rather obscure on the yellow surface, those on labrum somewhat deeper and more distinct; supraclypeal area impunctate medially, lateral areas of face below level of antennae very finely and closely punctate becoming minute and obscure but still rather close above where the surface is shining between eyes and ocelli, the more median punctures below ocelli much deeper and more distinct; vertex very finely and densely punctate behind ocelli, punctures becoming more distinct laterally; cheeks somewhat shining, punctures quite deep and distinct, well separated posteriorly, becoming minute toward eye margin; scutum and scutellum somewhat shining, the punctures rather sparse in a restricted median area of scutum posteriorly, becoming very close laterally and anteriorly, those on scutellum about equal in size but rather sparse; pleura with rather coarse and deep punctures, these slightly but not widely separated, becoming much finer and closer posteriorly above mid coxae; propodeum rather dull and tessellate posteriorly, punctures shallow but rather close, dorsal area becoming rather coarsely reticulate along upper margin, lateral faces rather dull, quite closely punctate; basal abdominal tergum with quite deep and distinct punctures across base, these well separated, becoming more minute and sparse toward apical margin,

much closer at each extreme side; terga 2-4 with fine but quite distinct punctures across basal area, these well separated on 2, somewhat closer on 3, quite close on 4, the apical impressed areas largely impunctate; tergum 5 quite densely punctate across base, with an obscure angle on each extreme side, and tergum 6 with an elongate, triangular, apical spine on each side; pubescence of entire head, thorax and legs pale ochraceous, the basal abdominal tergum largely pale ochraceous anteriorly and on lateral margins, the disc with suberect, more fuscous pubescence that is more evident laterally; discs of following terga with suberect, rather thin, dark pubescence which does not at all obscure the surface, more sparse on the apical impressed areas; tergum 2 with a narrow, basal, whitish fascia that is usually hidden by the preceding plate, and apical impressed area fringed by a narrow whitish fascia; impressed areas of 3 and 4 also fringed with whitish fasciae well removed from apical margin, that on 5 distinct but more nearly apical in position, 6 entirely dark pubescent; median length of pygidial plate about equal to basal width, margins carinate, rather strongly convergent apically to the abruptly constricted and truncate apex; sterna 7 and 8 and genital armature as in *agilis* (fig. 84).

DISTRIBUTION — Kansas and North Dakota, east to Maine and Georgia, July to October.

FLOWER RECORDS—LaBerge (1961) indicates that *Helianthus* is the primary source of pollen for *trinodis*, but he lists also species of *Arctium, Asclepias, Aster, Bidens, Blephilia, Carduus, Cassia, Cirsium, Coreopsis, Dichophyllum, Grindelia, Helenium, Heliopsis, Lepachys, Liatris, Monarda, Pepo, Petalostemum, Ratibida, Rudbeckia, Silphium, Solidago, Symphoricarpos, Teucrium, Verbena, Vernonia* and *Veronica*.

Melissodes (Eumelissodes) vernoniae Robertson

Melissodes vernoniae Robertson, 1902. Canad. Ent. 34, p. 323. ♀ ♂.
Melissodes confusiformis incondita Cockerell, 1925. Ann. Mag. Nat. Hist. (9) 16, p. 230. ♀.
Melissodes (Eumelissodes) vernoniae LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 517.

FEMALE—Length 12-13 mm., breadth of abdomen 4.5-5 mm.; black, mandibles more or less yellowish apically; antennal flagella more piceous beneath, black above; apical tarsal segments brownish-testaceous, the spurs pale testaceous; tegulae piceous, faintly testaceous posteriorly; wings hyaline, veins testaceous to brownish; cheeks subequal to eyes in width; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes very slightly convergent below; segment 2 of flagellum about half the length of segment 1; punctures of clypeus dull, punctures rather fine, close laterally, slightly separated medially, those on labrum uniformly fine and close; supraclypeal area with well separated punctures medially, becoming close laterally, and lateral areas of face below level of antennae with fine and rather close punctures, becoming minute and rather sparse above, where surface is shining between eyes and ocelli, the more median punctures below ocelli relatively coarse, deep and close; vertex very finely and densely punctate behind ocelli, becoming more distinctly separated laterally; cheeks somewhat shining, punctures very minute along eye margin, becoming relatively coarse and deep posteriorly; scutum and scutellum somewhat shining, punctures variable, rather coarse and well separated on scutum medially, becoming finer and closer around margin, those on scutellum about equal in size, slightly but not widely separated; punctures of pleura deep, rather coarse and quite close throughout, becoming very fine posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, not very coarse, somewhat separated, dorsal area becoming rather narrowly rugose along upper margin, lateral faces dull and tessellate, rather closely but shallowly punctate; basal abdominal tergum rather coarsely but shallowly punctate across basal half, surface rather dull, punctures slightly separated, becoming finer and closer at extreme sides where they nearly reach apical margin, the broad median apical area entirely impunctate; basal areas of terga 2-4 very finely punctate, the punctures minute and rather sparse on 2 medially, becoming somewhat deeper and closer laterally, somewhat closer on 3 and 4 but obscured by tomentum, apical impressed areas practically impunctate; pygidium elongate-triangular, median length somewhat greater than basal width, apex narrowly rounded; pubescence copious but rather short on head, largely pale, but with a few erect blackish hairs on vertex; scutum and scutellum with short, erect, fuscous or blackish pubescence, the anterior third of scutum ochraceous pubescent; pleura and propodeum entirely ochraceous pubescent; legs largely pale pubescent but fore and mid tibiae with some brownish pubescence on outer face apically, the basitarsi with fuscous hairs beneath; hind tibial scopa pale yellowish, hairs abundantly plumose; basal tergum with abundant but rather short, pale pubescence basally, and

with some shorter pale pubescence at extreme sides, the disc otherwise bare, with no evidence of dark hairs; tergum 2 with a narrow, basal, whitish fascia and a more median, narrow fascia that fringes the apical impressed area and is slightly interrupted medially, disc otherwise practically bare, with only very minute, appressed pale pubescence at all evident; apical impressed area of tergum 3 fringed with a pale fascia along the base, basal part of disc thinly covered with pale tomentum, apical area largely bare; apical impressed area of tergum 4 entirely covered with cream-colored tomentum, possibly slightly interrupted on apical margin medially, basal area with some appressed, pale tomentum and some more erect but rather short dark pubescence; terga 5 and 6 largely fuscous or blackish pubescent, but 6 with some erect pale hairs at each extreme side.

MALE—Length 10.5-11 mm., breadth of abdomen 4-4.5 mm.; black, clypeus entirely pale yellow, labrum with a median, basal, yellow maculation, and mandibles yellow at base, and with a somewhat more testaceous subapical maculation; antennal flagellum testaceous beneath, more brownish above; apical tarsal segments becoming brownish-testaceous, the spurs pale yellowish; tegulae brownish; wings whitish-hyaline, veins testaceous to brownish; apical margins of abdominal terga broadly yellowish-hyaline and transparent; cheeks somewhat narrower than eyes; clypeus only slightly protuberant, its median length slightly greater than distance between eyes below; basal segment of flagellum very slightly longer than pedicel, segment 2 nearly four times as long as segment 1 and pedicel combined; punctures of clypeus fine and quite close laterally, somewhat more definitely separated medially, quite obscure on the yellow surface, those on labrum somewhat deeper and more distinct but quite close; supraclypeal area narrowly impunctate medially, becoming closely punctate at each side, lateral areas of face below level of antennae, very finely and closely punctate, punctures becoming very minute and rather close on the shining surface above, between eyes and ocelli, the more median punctures below ocelli somewhat deeper and more distinct but still very fine; vertex very finely and densely punctate behind ocelli, punctures becoming much more distinct and separated laterally; cheeks shining, punctures minute anteriorly, becoming rather deep and distinct posteriorly; scutum somewhat shining between deep and rather coarse punctures, these well separated but not sparse over posterior half of disc, becoming much finer and closer laterally and anteriorly, those on scutellum about equal in size, well separated but not sparse; punctures of pleura deep and distinct, moderately coarse below, becoming much coarser above, very fine posteriorly above the mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, irregularly scattered, but quite numerous, dorsal area becoming rugose along upper margin medially, more striate laterally, lateral faces very finely and closely punctate; basal abdominal tergum with rather coarse but shallow, well separated punctures medially, becoming somewhat finer but closer laterally where they approach the apical margin, becoming minute and more sparse toward the broad impunctate apical area; terga 2-5 very finely punctate across base, these well separated but not sparse on 2 and 3, much closer on 4, but obscured by tomentum, apical impressed areas largely impunctate; tergum 5 with a distinct, triangular process on each extreme side, 6 with a more robust, subtriangular, apical spine on each side; pubescence of head, thorax, legs and basal abdominal tergum largely whitish, only scutum posteriorly and scutellum with a few inconspicuous dark hairs intermixed in the generally light pubescence; discs of abdominal terga with subappressed, largely pale, thin pubescence, becoming somewhat more erect on the more apical terga, tergum 2 with a basal whitish fascia, often covered in part by the preceding tergum, and apical impressed areas of terga 2-5 fringed basally with rather narrow whitish fasciae, apical rims largely bare; median length of pygidial plate somewhat less than basal width, margins sharply carinate, very slightly convergent apically to the abruptly constricted truncate apex; sterna 7 and 8 and genital armature as in *dentiventris* (fig. 84).

DISTRIBUTION — North Dakota to Texas, west to Idaho, and east to Illinois and Indiana, May to September.

FLOWER RECORDS—LaBerge (1961) states that while *vernoniae* is oligolectic on *Vernonia*, males and occasional females will visit other plants, and there may be some dependence upon *Helianthus* and *Ipomoea* for pollen. Records include species of the following: *Bidens, Gaillardia, Grindelia, Helianthus, Heliopsis, Ipomoea, Lacinaria, Lactuca, Liatris, Monarda, Polygonum, Rudbeckia, Silphium* and *Verbena*.

Melissodes (Eumelissodes) wheeleri Cockerell

Melissodes wheeleri Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 111. ♀.

Melissodes wheeleri Cockerell, 1906. Ann. Mag. Nat. Hist. (7) 17, p. 367. ♂.

Melissodes (Eumelissodes) wheeleri LaBerge, 1961. Univ. Kans. Sci. Bul. 42, p. 572.

FEMALE—Length 11 mm., breadth of abdomen 4.5 mm.; black, the apical tarsal segments becoming brownish-testaceous, spurs pale testaceous; tegulae piceous; wings subhyaline and somewhat whitish, veins testaceous to brownish; cheeks subequal to eyes in width; clypeus only very slightly protuberant, its median length half the distance between eyes below; eyes very slightly convergent below; clypeal punctures rather coarse and close, somewhat separated medially, becoming very fine, densely crowded and obscure toward apical margin, those of labrum very fine and close medially, becoming somewhat separated on each side; supraclypeal area sparsely punctate. lateral areas of face below level of antennae with fine, slightly separated punctures, becoming minute and rather sparse on shining surface above between eyes and ocelli, the more median punctures below ocelli quite coarse, deep and close; vertex very finely and densely punctate behind ocelli, becoming much more minutely and sparsely punctate laterally; cheeks somewhat shining, punctures exceedingly minute, becoming deeper and more distinct posteriorly; scutum somewhat shining between quite deep and rather coarse punctures, these quite sparse medially over posterior half of disc, becoming somewhat finer and much closer laterally and anteriorly, those on scutellum somewhat finer, distinctly but not widely separated; punctures of pleura quite coarse, close and deep, becoming somewhat finer and closer posteriorly above mid coxae; posterior face of propodeum dull and tessellate, punctures shallow, not very coarse, rather sparse, dorsal area rather finely and narrowly rugose along upper margin, lateral faces dull and densely tessellate, punctures shallow and rather obscure, obsolescent below; basal half of basal abdominal tergum dull, punctures fine, shallow and obscure, the broad apical area impunctate; basal areas of terga 2-4 minutely and quite obscurely punctate, the punctures well separated on 2, somewhat closer on 3, quite close on 4, apical impressed areas largely impunctate; pygidium rather broadly rounded apically; vertex with considerable erect, fuscous or black pubescence, fringed posteriorly with dense white pubescence, a few intermixed black hairs below the ocelli, otherwise head whitish pubescent; scutellum and posterior two-thirds of scutum with considerable erect fuscous pubescence, more or less intermixed with pale on scutum, the anterior third entirely whitish pubescent, and pleura and propodeum entirely pale pubescent; legs largely pale pubescent, but fore and mid tibiae with some appressed brownish pubescence on outer surface apically, and basitarsi with some brownish or fuscous hairs beneath; the hind tibial scopa pale yellowish, hairs abundantly plumose; basal abdominal tergum with rather short but copious pubescence basally and laterally, with no dark hairs evident on the disc; basal areas of terga 2-4 with very thin, inconspicuous dark pubescence, apical impressed areas with only very sparse, inconspicuous largely appressed, dark hairs; tergum 2 with an obscure, basal whitish fascia that is usually covered by the preceding tergum, apical impressed area narrowly fringed with a white fascia which is interrupted medially; apical impressed area of tergum 3 fringed basally with a whitish fascia that is somewhat more dense and conspicuous than on 2 and is subinterrupted medially; impressed area of 4 completely covered with white tomentum, forming a dense, broad, apical fascia; terga 5 and 6 entirely brownish pubescent.

MALE—Length 8-9.5 mm., breadth of abdomen 2.5-3.5 mm.; black, the clypeus largely yellow, with only the upper margin very narrowly blackened, labrum with a large, median yellowish maculation and mandibles each with a small, basal, yellowish spot, and more or less yellowish apically; antennal flagellum testaceous beneath, brownish-testaceous above; apical tarsal segments becoming testaceous, the spurs pale yellowish; tegulae dull testaceous to brownish; wings whitish-hyaline, veins pale yellowish to testaceous; apical margins of abdominal terga becoming more or less yellowish-hyaline apically; cheeks about equal to eyes in width; clypeus only very slightly protuberant, its median length about half the distance between eyes below; eyes rather strongly convergent below; basal segment of flagellum about equal to pedicel, segment 2 three or four times longer than combined length of segment 1 and pedicel; punctures of clypeus fine, rather well separated medially, becoming somewhat closer laterally, very obscure on the yellow surface, those on labrum fine, but somewhat deeper and more distinct, becoming slightly separated at each extreme side; supraclypeal area with fine, slightly separated punctures, lateral areas of face below level of antennae with somewhat finer and closer punctures, becoming minute but still rather close on the shining surface above, between eyes and ocelli, the more median punctures below ocelli very sparse and irregular, becoming somewhat coarser on each

side of mid-line; vertex with fine, densely crowded punctures behind ocelli, these becoming more minute and widely separated laterally, those on cheeks fine, but deep and distinct, except along margin of eye; scutum somewhat shining between quite coarse and deep punctures, these quite sparse on median area of disc posteriorly, becoming considerably finer and closer laterally and anteriorly, those on scutellum somewhat finer but quite close; punctures of pleura rather coarse but shallow, well separated but not sparse; posterior face of propodeum dull and tessellate, punctures fine, shallow, irregularly scattered and somewhat sparse, dorsal area becoming rather narrowly rugose or reticulate along upper margin, lateral faces rather dull, quite closely but obscurely punctate, the punctures obsolescent below; basal abdominal tergum with fine, rather well separated punctures on disc medially, these somewhat closer at extreme sides, and becoming minute and more sparse toward the rather narrowly impunctate apical margin; basal areas of terga 2-5 with very minute, scattered and rather sparse punctures, the apical impressed areas with only scattered, exceedingly minute and obscure punctures at all evident; disc of tergum 6 very dull, more reticulate than punctate; tergum 5 with a very obscure, low angle at each extreme side, and 6 with a corresponding triangular, rather robust, apical spine; pubescence quite copious, long and erect, entirely whitish on head, thorax, legs and basal abdominal tergum; discs of terga 2 and 3 with rather abundant but thin, suberect, whitish pubescence, and 4-6 with more elongate, erect pubescence which is dark in part; tergum 2 with a loose, inconspicuous, basal, whitish fascia that is usually hidden, and the apical impressed area obscurely fringed on each side by a whitish fascia, usually interrupted medially; apical impressed areas of 3-5 fringed with a whitish fascia which is narrow on 3, somewhat broader on 4 and quite broad on 5, nearly reaching the apical rim; tergum 6 with entirely brownish pubescence; median length of pygidial plate about equal to basal width, margins strongly carinate, slightly converging apically to the rather obscurely constricted truncate apex; sterna 7 and 8 and genital armature as in *agilis* (fig. 84).

DISTRIBUTION—Arizona to Louisiana, north to North Dakota and Michigan, April to October.

FLOWER RECORDS—LaBerge (1961) gives *Gaillardia, Helianthus* and *Rudbeckia* as the genera preferred by *wheeleri*, but lists also species of the following: *Anthemis, Asclepias, Cleome, Coreopsis, Echinacea, Engelmannia, Grindelia, Opuntia, Petalostemum, Ratibida, Silphium* and *Sphaeralcea*.

Table 9—Distribution of species of *Melissodes* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Melissodes (Melissodes)	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
bimaculata	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X
b. nulla																											X
communis				X					X	X							X				X	X	X	X	X	X	X
comptoides								X	X					X		X			X		X	X	X	X	X	X	X
tepaneca									X													X		X	X	X	X
(Heliomelissodes)																											
desponsa	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X			X			X		
(Apomelissodes)																											
apicata	X			X										X		X				X		X				X	X
fimbriata																			X			X		X		X	
mitchelli																						X				X	X
(Callimelissodes)																											
coloradensis							X		X	X	X											X					
(Eumelissodes)																											
agilis	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X			X	X	X	X		X	X	X	
bidentis													X														
boltoniae									X	X					X							X		X	X	X	X
coreopsis									X																		
denticulata				X		X	X	X	X	X			X	X	X	X		X	X	X	X	X			X	X	X
dentiventris				X		X		X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	
fumosa									X	X						X			X			X	X	X	X		
illata	X	X		X		X		X	X				X		X							X					
manipularis																						X	X			X	X
menuachus							X		X																		
nivea							X		X	X	X		X	X	X	X			X	X	X	X		X	X		
pilleata																						X					
rustica	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X		
subillata	X		X			X	X	X	X	X	X		X	X					X			X					
tincta								X	X												X	X	X	X		X	X
trinodis	X			X		X	X	X	X	X	X		X	X	X				X		X	X		X		X	
vernoniae									X	X																	
wheeleri							X	X																			

Xenoglossodes Ashmead

? Tetraloniella Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 61. Type: *Macrocera graia* Eversmann. Monob. and orig. desig.

Xenoglossodes Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 63. Type: *Melissodes albata* Cresson. Monob. and orig. desig.

Primarily *Xenoglossodes* is a western group of bees, and only one species extends east of the Mississippi in its range. The clypeus is contiguous with the eye margin, and is black in the females, yellow in the males. The maxillary palpi are 5- or 6-segmented. The abdominal fasciae are apical in position on each tergum, and the scopa is of simple hairs. In the males tergum 6 is angulate or spinose laterally, but tergum 7 lacks these lateral spines.

Xenoglossodes albata (Cresson)

(Fig. 86)

Melissodes albata Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 281. ♀ ♂.

Synhalonia albata Patton, 1879. U. S. Geol. and Geog. Surv. Bul. 5, p. 474. ♂ ♀.

Eucera albata Dalla Torre, 1896. Cat. Hym. 10, p. 224.

Xenoglossodes albata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-10 mm., breadth of abdomen 4 mm.; black, the mandibles reddish at base, testaceous on outer surface apically; antennal flagella brownish-piceous, legs more piceous, apical tarsal segments becoming testaceous, spurs pale yellow, tegulae yellowish-hyaline; wings whitish-hyaline, veins testaceous to piceous; cheeks much narrower than eyes; clypeus quite flat, its median length about half the distance between eyes below; eyes very slightly convergent below; mandibles rather short, rounded apically; labrum broadly triangular and quite densely pubescent, its median length about half the basal width; basal segment of flagellum somewhat shorter than 2nd and 3rd combined; clypeus dull, quite coarsely and densely punctate, the supraclypeal and lateral areas of face somewhat more finely and less densely punctate, punctures becoming minute and sparse on each side above, quite coarse and close medially, surface shining between eyes and ocelli; cheeks very finely and closely punctate beneath quite dense pubescence; scutum shining, punctures quite coarse, close in general but somewhat separated in median area posteriorly, those on scutellum somewhat finer and uniformly close, almost contiguous; pleura coarsely, closely and deeply punctate; posterior face of propodeum shining, punctures rather fine, irregularly scattered and sparse, dorsal area dull, obscurely rugose along upper margin, lateral faces quite closely and deeply punctate; abdominal terga finely and closely punctate beneath dense tomentum; pygidium elongate triangular, apex rather narrowly rounded; pubescence entirely white, rather short but copious and dense on head and thorax; legs largely white pubescent, outer surfaces of front and mid tibiae densely white tomentose, becoming somewhat yellowish at apex, basitarsi with yellowish pubescence beneath; hind tibial scopa white, hairs rather sparsely plumose; basal abdominal tergum somewhat more thinly covered with elongate greyish-white pubescence, apical margin narrowly yellow, following terga densely and completely white tomentose, hiding the surface, apical margins of the terga apparently narrowly yellow apically, faintly evident through the tomentum; apical margin of tergum 5 becoming yellowish tomentose medially; tergum 6 with yellowish-brown pubescence on each side of pygidium.

MALE—Length 8 mm., breadth of abdomen 3.5 mm.; black, the clypeus and labrum entirely bright yellow, and mandibles yellow at base; antennal flagellum brownish-testaceous beneath, piceous above; legs chiefly black, but apical tarsal segments becoming brownish-testaceous, spurs pale yellow; tegulae yellowish-hyaline, wings whitish-hyaline, veins yellowish to piceous; apical margins of abdominal terga narrowly yellowish-hyaline; cheeks much narrower than eyes; clypeus quite flat, its median length about half the distance between eyes below; eyes slightly convergent below; mandibles short, simple; labrum rather broadly rounded, its median length about half the basal width, densely covered with pubescence, hiding the surface; tergum 6 with a triangular apical process on each extreme side; clypeus quite coarsely and closely punctate, punctures rather vague on the yellow surface; supraclypeal area rather closely punctate, lateral areas of face below antennae very finely and closely punctate, punctures becoming minute and quite sparse above laterally, but deep, distinct and relatively coarse medially, surface shining between eyes and ocelli; cheeks somewhat shining, punctures close and fine; scutum somewhat shining between quite coarse and rather close punctures, these more distinctly separated medially over posterior half; scutellum with somewhat finer, quite crowded punctures; pleura quite coarsely and closely punctate throughout; propodeum rather dull, quite closely and rather coarsely punctate, becoming more finely rugose on dorsal area laterally, and lateral surfaces very finely and closely

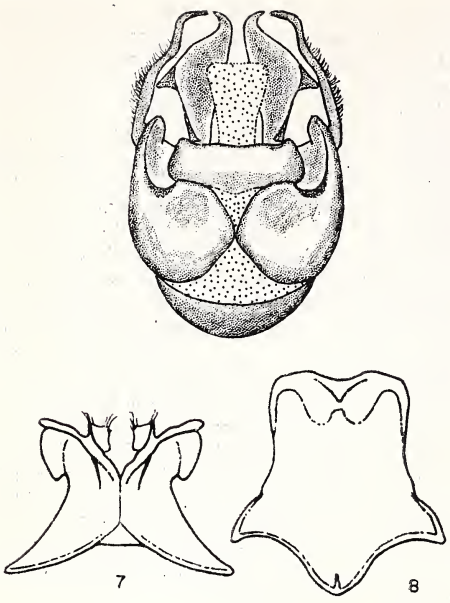


Figure 86
Genital armature and sterna 7 and 8 in male of *Xenoglossodes albata*.

punctate; basal abdominal tergum quite deeply and rather coarsely punctate toward base, punctures slightly separated, becoming finer and closer laterally and toward apical margin; following terga uniformly, finely and closely punctate beneath the tomentum; pubescence of head, thorax and legs rather short but dense and copious, entirely white, that on basal abdominal tergum rather thin but more elongate and erect, following terga with dense white tomentum; margins of pygidial plate carinate, convergent apically, apex rather narrowly rounded; sterna 7 and 8 and genital armature as shown (fig. 86).

DISTRIBUTION—Colorado and Texas to Illinois, June and July.

FLOWER RECORD—Robertson (1929) records this species on *Petalostemum purpureum*.

Tetralonia Spinola

Macrocera Latreille, 1810. Consèd. Gén. Crust. Arachn. Ins. p. 339. Preocc. Type: (*Eucera antennata* Fabricius) = *Apis malvae* Rossi. Desig. by Latreille, 1810.

Tetralonia Spinola, 1838. Soc. Ent. France Ann. 7, p. 538. (new name.)

Synhalonia Patton, 1879. U. S. Geol. and Geog. Survey Bul. 5, p. 473. Type: *Melissodes fulvitarsis* Cresson. Orig. desig.

Eusynhalonia Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 63. Type: *Melissodes edwardsii* Cresson. Monob. and orig. desig.

Synalonia Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 365. Emend.

Melissodes and allies, Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 74-97.

Tetralonia is a genus of rather robust, hairy bees. In the front wings the marginal cell is rather elongate, the tip slightly bent away from the costa, and the 2nd submarginal cell is much shorter than the 1st or the 3rd. The clypeus is separated laterally from the margin of the eye, the resulting space greater than that between the lower end of the eye and the mandible. The clypeus in the females is black, in the males yellow. Also, in females the basal segment of the antennal flagellum is slightly shorter than segments 2 and 3 combined, while in the males the corresponding (basal) segment is very short, no more than a fourth or fifth the length of segment 2, the flagellum being very long and slender, much longer than the thorax. The scopal hairs on the hind tibiae and basitarsi are simple. In males, terga 6 and 7 are neither angulate nor spinose laterally.

KEY TO SPECIES

Females

1. Scopa on hind legs black or fuscous . . 2
   Scopa pale in color 3

2. First recurrent vein joining second submarginal cell about a third before apex of cell; apical impressed area of tergum 2 well punctured . . . . . *atriventris* Smith (p. 313)
   First recurrent vein joining second submarginal cell about a fourth before apex of cell; apical impressed area of tergum 2 with very few or no punctures . . . . . *rosae* Robertson (p. 321)

3(1). Abdomen of uniform color, lacking pale fasciae 4
   Abdomen conspicuously pale fasciate . . 5

4. Abdomen entirely covered with bright fulvous tomentum . . . . . *fulvohirta* Cresson (p. 318)
   Abdomen black or fuscous pubescent on segments 2-4, whitish on segment 1, deep brownish-ferruginous on the more apical segments . . . . . *dubitata* Cresson (p. 316)

5(3). Hind tibial spurs hooked apically . . . . . *hamata* Bradley (p. 319)
   Hind tibial spurs straight and simple . . 6

6. At least the basal half of discs of terga 2-4 black pubescent, with white apical or subapical fasciae; 1st recurrent vein nearly interstitial with 2nd intercubital vein ..... *belfragei* Cresson (p. 315)
Terga 2-4 only narrowly black across base, the white fasciae very extensive; 1st recurrent vein well basad of 2nd intercubital vein ..... *speciosa* Cresson (p. 321)

Males

1. General aspect of abdomen black, with largely black pubescence and no conspicuous pale pubescence or fasciae .. 2
Abdomen either pale fasciate or with considerable conspicuous pale pubescence 5

2. Basal segment of flagellum nearly half the length of segment 2 ..... *illinoensis* Robertson (p. 321)
Basal segment of flagellum not more than one-fourth the length of segment 2 .. 3

3. First recurrent vein joining second submarginal cell about a third before apex of cell; basal segment of flagellum about one-fourth the length of the second ..... *atriventris* Smith
First recurrent vein joining second submarginal cell about a fourth before apex of cell; basal segment of flagellum about one-fifth the length of the second segment 4

4. Basal segment of flagellum slightly broader than long; dorsum of thorax with bright fulvous pubescence ..... *rosae* Robertson (p. 321)
Basal segment of flagellum slightly longer than broad; dorsum of thorax with yellowish-white pubescence ..... *dubitata* Cresson (p. 316)

5(1). Pubescence of abdomen entirely pale fulvous, with no black hairs at all evident ..... *fulvohirta* Cresson (p. 318)
Abdominal terga with at least some intermixture of black pubescence, the pale hairs more greyish or whitish 6

6. Hind tibial spurs hooked at tip ..... *hamata* Bradley (p. 319)
Hind tibial spurs straight 7

7. Labrum black; basal segment of flagellum nearly half as long as segment 2 ..... *belfragei* Cresson (p. 315)
Labrum yellow; segment 2 of flagellum at least three times the length of segment 1 8

8. Tergum 2 quite densely pale pruinose, obscuring the surface ..... *speciosa* Cresson (p. 321)
Tergum 2 black pubescent basally, or with thin, erect, pale pubescence which does not hide surface 9

9. First recurrent vein meeting 2nd submarginal cell slightly less than one-third from its apex; abdominal tergum 2 with a subapical fringe of black pubescence ..... *frater* Cresson (p. 317)
First recurrent vein meeting 2nd submarginal cell no more than a fourth from its apex; tergum 2 with no black pubescence . *dubitata* Cresson (p. 316)

Tetralonia atriventris (Smith)

(Figs. 87-89)

Melissodes atriventris Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 310. ♂.

Synhalonia atriventris Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 353. ♀ ♂.

Synhalonia atriventris fuscipes Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 54. ♀. (preocc.)

Tetralonia robertsoni Cockerell, 1914. Ann. Mag. Nat. Hist. (8) 13, p. 283. ♀. (new name)

Tetralonia robertsonii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Tetralonia atriventris Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 221. (biology)

FEMALE—Length 13-15.5 mm., breadth of abdomen 5-6 mm.; black, the legs largely black, spurs testaceous, tegulae brownish-piceous; wings lightly infuscated, veins piceous to black, 2nd recurrent vein reaching 3rd submarginal cell much nearer apex than 1st does to apex of 2nd submarginal; cheeks slightly narrower than eyes; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes (fig. 87); eyes subparallel; mandibles simple; basal segment of flagellum only slightly shorter than segments 2 and 3 combined; punctures of clypeus rather coarse, distinctly but not widely separated; punctures on labrum close medial-

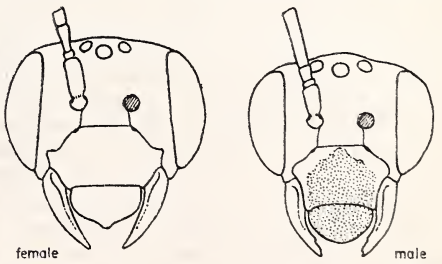


Figure 87
Facial view of head of both sexes of *Tetralonia atriventris*.

ly, becoming very sparse laterally; supraclypeal area rather dull, sparsely punctate, surface laterally rather dull, with well separated, rather fine punctures, becoming more shining above where punctures become relatively close, but with a shining, impunctate area laterad of each lateral ocellus; cheeks rather dull, very finely, closely and obscurely punctate; scutum dull, punctures shallow but rather coarse, quite sparse in median area of disc posteriorly; scutellum more shining, punctures fine, distinct, rather close and regular; pleura dull, very finely and closely punctate except along anterior margin where surface is shining and punctures obsolescent; posterior face of propodeum somewhat shining, punctures very fine, shallow and vague, lateral faces dull and tessellate, rather closely punctate posteriorly, the punctures becoming obsolescent anteriorly and below; dorsal surface of basal abdominal tergum rather coarsely and shallowly punctate medially, punctures well separated but hardly sparse, becoming finer but deeper and more distinct, very close at each side, apical margin rather broadly impunctate; apical impressed areas of terga 2-5 very finely and closely punctate, only the very narrow apical rims on 2 and 3 impunctate; pygidium triangular, with rather narrowly rounded apex; pubescence long and copious, entirely pale ochraceous on head and thorax, legs largely pale pubescent basally, becoming fuscous or blackish on the more apical segments, hind tibial scopa black; basal abdominal tergum with copious, elongate, pale ochraceous pubescence basally, disc apically with very short, suberect, fuscous or blackish pubescence evident on each side, median area largely bare; discs of remaining terga rather densely covered across base with short, suberect, blackish pubescence, this becoming much shorter and thinner on impressed areas of 2 and 3, with some more elongate, erect hairs on discs of the following terga.

MALE—Length 13-15 mm., breadth of abdomen 5-5.5 mm.; black, clypeus and labrum yellow, upper margin of clypeus narrowly invaded with black, and lateral and apical margins of labrum narrowly darkened; mandibles somewhat yellowish apically; apical tarsal segments becoming brownish-testaceous, spurs testaceous, tegulae piceous; wings subhyaline, veins testaceous to piceous, the 2nd recurrent vein reaching 3rd submarginal cell much nearer apex than 1st recurrent does to apex of 2nd submarginal; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes (fig. 87); eyes subparallel; mandibles obscurely bi-dentate apically, but this often inevident due to wear; basal segment of flagellum fully twice as long as pedicel, and segment 2 three times longer than first; tibial spurs straight and simple; punctures of clypeus rather coarse and evenly distributed, slightly separated, those on labrum finer and closer medially, becoming very sparse laterally; supraclypeal area dull but rather smooth, sparsely punctate, surface on each side below level of antennae dull and tessellate, punctures fine and well separated, somewhat coarser and closer above antennae; cheeks rather smooth but dull, punctures exceedingly minute and obscure; scutum dull, punctures rather shallow and coarse, slightly separated in center of disc posteriorly, becoming much finer and closer laterally and anteriorly; scutellum somewhat shining anteriorly, punctures rather fine,

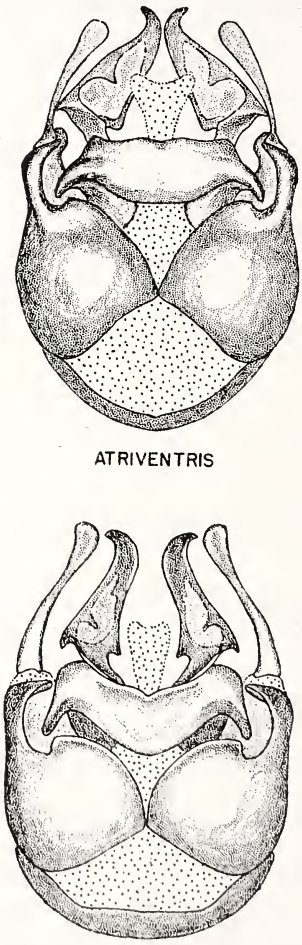


Figure 88
Genital armature in males of *Tetralonia atriventris* and *T. hamata*.

slightly separated, surface finely rugose along posterior margin; pleura dull, very finely and quite closely punctate; posterior face of propodeum rather dull, punctures very fine, shallow and obscure, the dorsal triangle becoming shallowly rugose along upper margin, lateral faces dull, very finely and obscurely punctate; punctures of abdominal terga shallow, rather fine and quite close in general, well separated medially on the more basal terga, becoming very close laterally and much closer on the more apical terga, the apical impressed areas finely and somewhat more sparsely punctate, with only the narrow apical rims impunctate; pubescence of head and thorax very long and copious, entirely pale ochraceous to whitish, and legs largely pale pubescent; basal abdominal tergum with copious, elongate, pale ochraous pubescence basally, but with some darker pubescence apically, visible on each side; following terga entirely covered with short, erect, rather copious but thin, fuscous or blackish pubescence, that on 6 bcoming somewhat paler, with some long pale hairs at each side; median length of pygidial plate considerably greater than basal width, margins carinate, nearly parallel, slightly but abruptly constricted near the subtruncate, rather broad apex; sterna 7 and 8 (fig. 89) and genital armature (fig. 88) as shown.

DISTRIBUTION—Minnesota to Pennsylvania, south to Georgia, March to July.

FLOWER RECORDS — *Aesculus, Lupinus, Mertensia, Robinia* and *Vicia.* Robertson (1929) records *atriventris* (as *T. robertsonii*) on *Astragalus mexicanus.*

Tetralonia belfragei (Cresson)

Melissodes belfragei Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 278. ♀.

Melissodes honesta Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 279. ♂.

Tetralonia belfragei Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 15 mm., breadth of abdomen 5.5 mm.; black, the antennae and legs somewhat more piceous, spurs pale testaceous, tegulae testaceous-hyaline; wings subhyaline, veins testaceous to piceous; cheeks subequal to eyes; clypeus slightly protuberant, its median length somewhat less than half the distance between eyes; eyes subparallel; mandibles entire apically; basal segment of flagellum slightly shorter than segments 2 and 3 combined; tibial spurs straight and simple; clypeus coarsely, confluently punctate throughout, labrum with very fine, close punctures medially, these becoming somewhat more coarse and sparse laterally; supraclypeal area dull, rather sparsely punctate medially, lateral areas of face below level of antennae very finely and rather closely punctate, the surface dull, surface above antennae somewhat more coarsely but quite closely punctate, the polished areas adjacent to lateral ocelli with exceedingly minute, sparse punctures; cheeks rather dull, minutely and closely punctate below, somewhat more coarsely and deeply so above; punctures rather coarse and deep, only slightly separated in median area of scutum posteriorly, becoming finer, closer and rather obscure laterally and anteriorly; scutellum somewhat more finely but very deeply and closely punctate throughout; pleura dull, densely tessellate, punctures rather shallow but close throughout; posterior face of propodeum rather dull, punctures shallow and vague, rather sparse and irregular, dorsal area becoming somewhat coarsely roughened or rugose along upper margin, lateral areas dull, quite closely and shallowly punctate; disc of basal abdominal tergum quite coarsely and closely punctate across basal area, punctures becoming much finer and closer laterally, the rather broad, apical margin polished and impunctate, the more median punctures rather sparse; punctures of basal areas of terga 2-4 fine but deep and distinct, quite close on 2, becoming more densely crowded on 3 and 4, largely obscured by dense tomentum, the apical impressed areas minutely and sparsely punctate in part, the rather narrow, apical rims impunctate; median length of pygidium slightly greater than basal width, apex rather broadly rounded; pubescence copious and elongate, entirely pale on head and thorax, whitish on face below and on thorax laterally and posteriorly, the vertex and dorsum of thorax somewhat more yellowish pubescent; legs largely covered with pale pubescence, somewhat more brownish and quite dense on outer face of mid tibiae, basitarsi with reddish-brown hairs; hind tibial scopa whitish; pubescence of basal abdominal tergum whitish, rather copious and elongate, with no dark hairs in evidence, apical rim bare; basal areas of terga 2-5 densely covered with appressed black tomentum, this followed by a broad and dense, white tomentose fascia which is slightly removed from rim on 2 and 3, but is entirely apical on 4; tergum 5 brownish pubescent across median area of apical margin, but becoming white at extreme sides; pubescence of tergum 6 brownish on each side of pygidium.

MALE—Length 11-12.5 mm., breadth of abdomen 4-5 mm.; black, the clypeus and labrum largely or entirely whitish-yellow; apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, tegulae testaceous-hya-

line; wings subhyaline or very faintly brownish, veins testaceous to black; cheeks subequal to eyes in width; clypeus somewhat protuberant, its median length very slightly greater than half the distance between eyes below; eyes very slightly convergent below; mandibles obscurely bi-dentate apically; apical margin of labrum deeply, triangularly incised medially; basal segment of flagellum about twice length of pedicel, segment 2 about three times the length of segment 1 and pedicel combined; mid and hind tibial spurs straight and simple; punctures of clypeus rather coarse and close throughout, somewhat obscure on yellowish surface, labrum quite sparsely punctate throughout, but with a few fine, close punctures medially; supraclypeal area dull and densely tessellate, with only a few, very shallow, obscure, scattered punctures, lateral areas of face below level of antennae dull, punctures rather shallow but quite close, surface above antennae rather dull, punctures scattered and irregular, a limited area adjacent to lateral ocelli largely impunctate; cheeks rather dull, punctures shallow but fine and rather close; median area of scutum posteriorly somewhat shining, punctures deep and distinct, well separated but hardly sparse, becoming fine and close laterally, anteriorly, and to some degree posteriorly; scutellum with somewhat finer but deep, distinct, uniformly close punctures (punctures are quite sparse medially on scutum and scutellum in some specimens); pleura dull, punctures shallow and rather vague, usually quite close throughout; posterior face of propodeum rather dull, punctures scattered and irregular, rather sparse, dorsal area becoming somewhat vaguely rugose or striate along upper margin, lateral faces dull, rather finely and closely punctate; punctures of abdominal terga rather deep and distinct, fine in general, well separated on basal tergum medially, becoming very fine and quite close laterally, only the narrow apical margin impunctate; punctures of the following terga quite deep and distinct, finer and closer on the more apical terga, apical margins somewhat invaded by finer and more sparse punctures, apical rims narrowly impunctate; pubescence copious and elongate, pale ochraceous to almost whitish on head, deeper ochraceous on thorax, legs with entirely whitish pubescence, and basal abdominal tergum with long, copious, pale ochraceous to whitish pubescence, tergum 2 with somewhat shorter but erect thin pale pubescence across the base, the depressed apical margin very narrowly and thinly whitish fasciate, this rather widely interrupted medially; terga 2-4 with thin, rather short but erect, blackish pubescence across basal areas, apical impressed area fringed with a quite dense but narrow whitish fascia, that on 5 more nearly apical in position; and apical margin of 6 with rather dense and elongate whitish pubescence medially, this becoming much narrower laterally; median length of pygidial plate somewhat greater than basal width, sharply carinate, nearly parallel, rather abruptly but only slightly constricted near the broadly truncate, apical margin.

DISTRIBUTION — Texas to Michigan, in April.

FLOWER RECORDS — Robertson (1929) records *belfragei* on the following: *Aesculus, Arabis, Camassia, Cercis, Claytonia, Collinsia, Dentaria, Dicentra, Erythronium, Geranium, Hydrophyllum, Isopyrum, Lithospermum, Mertensia, Pentstemon, Polemonium, Ranunculus* and *Viola.*

Tetralonia dubitata (Cresson)

(Fig. 89)

Melissodes dubitata Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 194. ♀ ♂.

Tetralonia dubitata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 14.5-15 mm., breadth of abdomen 5.5-6 mm.; black, the antennal flagella more piceous beneath; legs blackish, the apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, tegulae testaceous-hyaline; wings lightly but uniformly infuscated, veins brownish to piceous; cheeks subequal to eyes in width; clypeus slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes subparallel; mandibles rounded or subtruncate at apex; basal segment of flagellum slightly shorter than segments 2 and 3 combined; mid and hind tibial spurs relatively straight and simple, tips somewhat curved but not abruptly hooked or recurved; punctures of clypeus quite coarse but densely crowded in large part, those on labrum somewhat separated at each side; supraclypeal area with scattered, rather coarse, sparse punctures, lateral areas of face below level of antennae quite closely and deeply punctate, surface above antennae dull, sparsely and obscurely punctate adjacent to eye, becoming rather coarsely but shallowly rugoso-punctate medially, a limited area adjacent to lateral ocelli shining and impunctate; cheeks finely but rather deeply and closely punctate; median posterior area of scutum shining, punctures rather deep and quite coarse, well separated but hardly sparse, becoming somewhat finer and close laterally and anteriorly, and more narrowly across posterior margin; scu-

tellum very finely, closely and distinctly punctate; pleura dull, punctures quite close and rather fine; posterior face of propodeum dull and tessellate, punctures very shallow, quite sparse, dorsal area becoming narrowly and shallowly rugose along upper margin laterally, the lateral faces dull, closely and finely punctate below and posteriorly, more sparsely so above; basal abdominal tergum quite coarsely and closely punctate across the broad median area, becoming finer and closer laterally, the rather broad, apical margin shining and impunctate; punctures of terga 2-5 fine but deep and distinct, somewhat separated on 2-4, densely crowded on 5, apical impressed areas punctate in part, punctures somewhat finer and more sparse than on basal areas, apical margins rather narrowly shining and impunctate; pygidium triangular, tip narrowly rounded; pubescence rather copious and elongate, entirely pale ochraceous on head, thorax and legs, somewhat more brownish on outer surface of mid tibiae apically, and basitarsi with pale brownish hairs beneath, hind tibial scopa yellowish; pubescence of basal abdominal tergum quite copious and elongate, entirely pale, almost white, apical rim largely bare; discs of terga 2-5 with quite dense, short fuscous pubescence basally, median area following this more thinly, dark pubescent, apical impressed area with subappressed dark pubescence over the punctate area, the apical, impunctate rims bare; apical margin of tergum 5 narrowly pale brownish pubescent, and tergum 6 brownish pubescent on each side.

MALE—Length 11.5-12 mm., breadth of abdomen 4-4.5 mm.; black, the clypeus and labrum entirely yellow; legs more piceous, apical tarsal segments brownish-testaceous, spurs pale yellow, tegulae yellowish-hyaline; wings lightly but uniformly brownish, veins pale testaceous to piceous; apical margins of abdominal terga very narrowly testaceous-hyaline; cheeks subequal to eyes in width; clypeus only slightly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; mandibles entire or obscurely bidentate apically; basal segment of flagellum considerably longer than pedicel, segment 2 about three times longer than segment 1 and pedicel combined; tibial spurs slightly curved at tip, but neither hooked nor recurved; punctures of clypeus rather coarse and close throughout, those on labrum fine and close medially, becoming quite sparse laterally; supraclypeal area dull and rather sparsely punctate, lateral areas of face below level of antennae finely, closely and shallowly punctate, surface above antennae dull, very sparsely and obscurely punctate adjacent to eye margin, the more median punctures rather deep, distinct and quite close, a limited area adjacent to lateral ocellus shining and impunctate; cheeks rather dull, punctures very fine, quite close but irregular; median area of scutum posteriorly somewhat shining, punctures quite deep, distinct and well separated, becoming close laterally, anteriorly, and to some degree posteriorly, scutellum somewhat shining anteriorly, punctures rather fine, slightly separated, becoming densely crowded laterally and posteriorly; pleura dull, punctures shallow rather close but not crowded; posterior face of propodeum somewhat shining, punctures shallow and vague, dorsal area becoming irregularly reticulate or striate along upper margin, lateral faces dull, shallowly and rather closely punctate; punctures of abdominal terga quite deep and distinct, surface more or less shining, apical impressed areas punctate in part, only the narrow apical rims impunctate, punctures becoming more minute on the more apical terga, slightly but not widely separated in general, not much closer at sides than in mid-line; pubescence long, copious and erect, entirely pale ochraceous to whitish on head and thorax, legs entirely pale pubescent, and basal tergum with elongate and rather copious pale pubescence, with a few short, dark hairs apically on each extreme side; terga 2-5 with or without narrow, subapical whitish fasciae, discs of 2-6 with rather short but erect dark pubescence which is rather thin and does not obscure the surface, impressed areas with more subappressed dark hairs, the hairs becoming more elongate on the more apical terga; tergum 6 more brownish pubescent apically; median length of pygidial plate slightly greater than basal width, margins carinate, rather strongly converging apically to the narrowly rounded or subtruncate apex; sterna 7 and 8 as shown (fig. 89); genital armature similar to *hamata* (fig. 88).

DISTRIBUTION — Minnesota to Pennsylvania, south to Georgia, April to June.

FLOWER RECORDS—*Aesculus, Melilotus, Robinia* and *Salvia.* Robertson (1929) records *dubitata* on *Astragalus, Dicentra* and *Mertensia.*

Tetralonia frater (Cresson)

Melissodes frater Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 197. ♂.

MALE—Length 12 mm., breadth of abdomen 5 mm.; black, the clypeus and labrum entirely yellow; legs black, apical tarsal segments brownish-testaceous, spurs pale yellow, tegulae black; wings subhyaline, veins testaceous to piceous; cheeks slightly broader than eyes; clypeus quite strongly protuberant, its

median length slightly greater than half the distance between eyes below; eyes very slightly convergent below; mandibles obscurely bidentate apically; basal segment of flagellum considerably longer than pedicel, segment 2 about two and one-half times longer than segment 1 and pedicel combined; tibial spurs straight apically, neither hooked nor recurved; punctures of clypeus rather coarse, slightly separated, those on labrum fine, shallow and rather obscure; supraclypeal area dull and sparsely punctate; lateral areas of face below level of antennae finely, closely and shallowly punctate, surface above antennae dull, finely and rather closely punctate, a limited area adjacent to lateral ocellus shining and impunctate; cheeks dull, punctures minute and hardly evident; scutum dull and tessellate, punctures fine, shallow and quite sparse posteriorly, hardly visible laterally and anteriorly; scutum dull, punctures somewhat more distinct and close; pleura dull, densely tessellate, punctures very fine and close; propodeum tessellate, punctures shallow and vague, dorsal area becoming obscurely rugose along upper margin; punctures of abdominal terga quite deep and distinct but fine and close on the more basal plates, surface more or less shining, apical impressed areas minutely punctate, the narrow apical rims impunctate, punctures becoming more minute and close on the more apical terga; pubescence long, copious and erect on head and thorax, pale ochraceous to whitish, entirely white on legs; basal abdominal tergum with elongate and rather copious whitish pubescence, discs of following terga with rather thin but erect whitish pubescence, impressed areas of 2-4 with a transverse line of black hairs; terga 5 and 6 rather densely white tomentose apically; median length of pygidial plate about twice the basal width, margins carinate, slightly converging apically to the truncate apex; sterna 7 and 8 and genital armature similar to those in *atriventris* (figs. 88 and 89).

DISTRIBUTION—This seems to be primarily western in its range, but has been recorded from Wisconsin and Illinois.

It seems possible that this should be considered a subspecies of *atriventris*. No positive opinion seems to be justified until the female has been recognized.

Tetralonia fulvohirta (Cresson)

(Fig. 89)

Melissodes fulvohirta Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 213. ♂.

FEMALE—Length 15-16 mm., breadth of abdomen 5.5-6.5 mm.; black, the apical tarsal segments becoming brownish-testaceous; tegulae yellowish-hyaline; wings lightly infuscated, veins pale testaceous to piceous; abdominal terga broadly yellowish-hyaline and transparent apically beneath dense tomentum; cheeks slightly narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes; eyes subparallel; mandibles entire or obscurely bidentate at apex; basal segment of flagellum about equal to segments 2 and 3 combined; tibial spurs straight and simple; punctures of clypeus quite coarse, deep and close, those on labrum very close medially, becoming slightly separated and coarser at each side; supraclypeal area rather closely but shallowly punctate, lateral areas of face below level of antennae finely and closely punctate, surface above antennae closely and finely punctate across entire width of face except for a shining, median impunctate line below the anterior ocellus; cheeks somewhat shining beneath dense pubescence, punctures fine and quite close throughout; median posterior area of scutum shining between deep, distinct, slightly separated punctures, becoming closer over anterior half and more narrowly along the lateral and posterior margins; scutellum shining between somewhat finer but quite deep and distinct, close punctures; pleura dull beneath dense pubescence, very finely and closely punctate throughout; posterior face of propodeum rather dull, punctures shallow, well separated but hardly sparse, dorsal area becoming narrowly and finely rugose along upper margin, lateral faces closely punctate, punctures rather coarse posteriorly, becoming very minute and densely crowded anteriorly and below; basal abdominal tergum deeply, distinctly and quite closely and coarsely punctate across disc, punctures becoming somewhat more minute and sparse toward the rather broadly hyaline apical margin; the more apical terga very finely and closely punctate basally, punctures becoming more minute and sparse apically on each, inevident on 4 and 5 due to dense tomentum; pygidium triangular, with rather narrowly rounded apex.

MALE—Length 12.5-13.5 mm., breadth of abdomen 5.5 mm.; black, the clypeus and labrum bright yellow, mandibles more or less yellowish toward apex, apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings very lightly infuscated, veins testaceous to piceous; apical impressed areas of abdominal terga yellowish-hyaline and transparent; cheeks slightly narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes; eyes subparallel; mandibles entire or obscurely bi-dentate at tips;

basal segment of flagellum fully twice as long as pedicel, segment 2 nearly five time longer; tibial spurs straight and simple; punctures of clypeus rather coarse, deep and close, those on labrum somewhat finer and closer medially, becoming somewhat coarser laterally; supreclypeal area dull, punctures fine and rather sparse, lateral areas of face below level of antennae very finely and closely punctate, surface above antennae quite closely and finely punctate across entire width except for a median impunctate line below anterior ocellus; cheeks very finely and rather closely punctate beneath dense pubesence; median posterior area of scutum shining, quite deeply and coarsely punctate, punctures only slightly separated, becoming much closer anteriorly, laterally and along the narrow posterior margin; scutellum shining, somewhat more finely but very closely punctate throughout; pleura dull, punctures fine and close throughout; posterior face of propodeum rather dull, punctures shallow and irregular, dorsal area becoming rather finely and irregularly rugose along upper margin, lateral faces dull, very finely and very closely punctate; punctures of basal abdominal tergum somewhat coarser than those on the following terga, well separated medially, becoming somewhat finer and closer laterally, and becoming very minute and rather sparse toward the apical, impunctate rim; terga 2-5 with very fine and quite close punctures across basal areas, the yellow apical impressed areas somewhat more finely and sparsely punctate, only the very narrow rims becoming impunctate; pubescence long and copious, entirely pale ochraceous on head, thorax and legs; basal abdominal tergum with copious, elongate, pale ochraceous pubescence, the following terga with short but erect, rather thin, pale yellowish pubescence, apical impressed areas with more decumbent and dense yellowish tomentum, forming rather distinct fasciae; tergum 6 with a distinct angle at each extreme side; median length of pygidial plate somewhat greater than basal width, margins carinate, rather strongly convergent apically, a very slight constriction near the broadly rounded apex; sterna 7 and 8 as shown (fig. 89); genital armature much as in *hamata* (fig. 88), but gonostyli short pubescent on outer sides.

DISTRIBUTION — North Carolina to Georgia, April to May.

FLOWER RECORDS — *Eleagnus* and *Vicia.*

Tetralonia hamata Bradley

(Figs. 88 & 89)

Tetralonia dilecta Folsom (not Cresson), 1922. Ent. Soc. Amer. Ann. 15, p. 182. (biology)

Tetralonia dilecta Robertson (not Cresson), 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Tetralonia hamata Bradley, 1942. Ent. News 53, p. 189. ♂ ♀.

FEMALE—Length 16-17 mm., breadth of abdomen 5.5-6.5 mm.; black, the antennal flagella piceous beneath, blackish above; mandibles becoming obscurely yellowish apically; legs somewhat reddish-piceous, apical tarsal segments becoming more testaceous, spurs pale testaceous; tegulae yellowish-hyaline and transparent; wings subhyaline basally, becoming lightly clouded apically, veins pale testaceous to piceous; cheeks subequal to eyes in width; clypeus strongly protuberant its median length about half the distance between eyes; eyes subparallel; mandibles rather blunt and entire apically; basal segment of flagelum about one half times longer than segment 2; mid and hind tibial spurs abruptly hooked or reflexed apically; clypeus quite coarsely and closely punctate above, punctures becoming somewhat more distinctly separated below laterally; labrum with rather fine and very close punctures medially, these becoming somewhat coarser and more sparse laterally; supraclypeal area impunctate medially, becoming rather closely punctate on each side, lateral areas of face below level of antennae very closely and finely punctate, surface above antennae with somewhat more definitely separated but still rather fine and close punctures; cheeks rather dull beneath the pubescence, very finely and quite closely punctate; posterior half of scutum somewhat shining, punctures quite coarse, deep and close, becoming much finer and closer laterally and anteriorly; scutellum more finely and quite closely punctate except for the narrow, anterior margin which is shining and impunctate; pleura dull, very finely and closely punctate throughout; posterior face of propodeum somewhat shining, punctures very fine, shallow and obscure, rather sparse, dorsal area becoming finely rugose along upper margin, more striate at each extreme side, lateral faces dull, finely and quite closely punctate; basal abdominal tergum quite closely and distinctly punctate across basal half, punctures well separated medially, becoming very fine and close laterally, the broad, apical, impressed area shining and impunctate; basal area of tergum 2 very finely and closely punctate, but this covered in large part by dense tomentum, apical impressed area largely shining and impunctate, but invaded slightly by very minute, scattered punctures; basal area of tergum 3 apparently finely and closely punctate, but largely obscured by dense tomentum, about half of apical im-

pressed area also minutely and rather closely punctate, only the rather narrow, apical rim entirely impunctate; surface of terga 4 and 5 entirely obscured by dense tomentum; pygidium rather broadly triangular, apex rather narrowly rounded; pubescence long and copious, entirely pale ochraceous on head, thorax and legs, scopa pale ochraceous; basal abdominal tergum with rather copious, elongate, pale ochraceous or whitish pubescence across basal half, disc with a very small amount of subappressed, dark pubescence at extreme sides; tergum 2 with a narrow basal area of dense fuscous pubescence, partially hidden by preceding tergum, followed by a band of dense, white tomentum that barely reaches margin of apical impressed area which is bare, forming a rather conspicuous, transverse fascia; tergum 3 with a basal, fuscous, tomentose band, followed by a band of white tomentum that partially covers the apical impressed area, apical half of this bare; tergum 4 largely fuscous tomentose across disc, apical impressed area entirely white tomentose; and disc of tergum 5 fuscous tomentose basally, apical impressed area densely white tomentose at sides, but more narrowly brownish-tomentose medially; tergum 6 more brownish pubescent on each side.

MALE—Length 13.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, clypeus and labrum entirely yellow, supraclypeal area narrowly yellow over margin of clypeus, the mandibles more or less yellowish apically, flagella brownish-piceous, tarsal segments of legs becoming brownish-testaceous, spurs pale yellowish, tegulate yellowish-hyaline; wings subhyaline, becoming very faintly infuscated apically, veins testaceous to piceous; cheeks very slightly narrower than eyes; clypeus quite strongly protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles obscurely bi-dentate apically; shorter side of basal segment of flagellum fully twice the length of pedicel, segment 2 three times longer; mid and hind tibial spurs abruptly hooked or reflexed apically; punctures of clypeus quite coarse and deep, close above and laterally, becoming somewhat separated toward apex medially, obscure on the yellow surface, those on labrum much finer and closer medially, becoming rather sparse on each side; supraclypeal area largely impunctate, lateral areas of face below antennae dull, finely, closely and rather obscurely punctate, surface above antennae closely and finely punctate, but a limited area laterad of lateral ocelli shining and impunctate; cheeks very finely and closely punctate beneath dense pubescence; median posterior area of scutum somewhat shining, punctures rather fine, somewhat separated becoming close laterally and anteriorly, and more narrowly across posterior margin; scutellum shining, punctures somewhat finer and quite close throughout; pleura dull, very finely and closely punctate throughout; posterior face of propodeum dull and tessellate, punctures shallow but quite close, dorsal area dull, becoming rather coarsely and shallowly reticulate along upper margin, lateral faces dull, finely and rather closely punctate; discs of abdominal terga finely and rather closely and uniformly punctate across basal areas, punctures becoming somewhat more minute and more widely separated on apical impressed areas, only the narrow, apical margins impunctate; punctures of basal tergum somewhat coarser and deeper than on the others, becoming increasingly fine on the more apical terga; tergum 6 with a rather pronounced angle on each extreme side; pubescence quite copious and elongate, entirely pale ochraceous on head, thorax, legs and basal abdominal tergum; tergum 2 with abundant, erect but rather thin pale pubescence across base, apical impressed area fuscous pubescent, hairs somewhat decumbent; terga 3 and 4 with short, pale, rather thin, suberect tomentum across basal areas, with interspersed longer, erect, black hairs, margin of impressed area thinly whitish fasciate, rims becoming black pubescent; basal area of tergum 5 black pubescent, impressed apical area almost completely covered with whitish tomentum, forming a rather broad, subapical fascia, the rim narrowly bare, but without dense black pubescence; tergum 6 black pubescent basally, with a broad, whitish, apical fascia and elongate white hairs at each side; pubescence of tergum 7 more yellowish on each side of pygidial plate; median length of pygidial plate slightly greater than basal width, margins carinate, slightly converging apically to the rather abruptly constricted, broadly rounded apex; sterna 7 and 8 (fig. 89) and genital armature (fig. 88) as shown.

DISTRIBUTION — Wisconsin to Maryland, south to Mississippi and Georgia, April to August.

FLOWER RECORDS — *Brassica, Robinia, Rubus, Salvia, Trifolium* and *Vicia.* Robertson (1929) records this species (as *dilecta* Cresson) on the following: *Aesculus, Asclepias, Astragalus, Baptisia, Blephilia, Camassia, Capsella, Cardamine, Cercis, Claytonia, Collinsia, Commandra, Convolvulus, Cornus, Crataegus, Delphinium, Dianthera, Dodecatheon, Ellisia, Fragaria, Geranium, Gymnocladus, Heracleum, Hydrophyllum, Iris, Krigia, Lithospermum, Lithrum, Lobelia, Melilotus, Mertensia,*

Monarda, Nepeta, Oenothera, Oxalis, Pentstemon, Petalostemum, Phlox, Podophyllum, Polemonium, Prunus, Ptelea, Pyrus, Ranunculus, Ribes, Rosa, Ruellia, Salix, Scutellaria, Senecio, Stellaria, Tradescantia, Verbena, Verbesina, Viburnum, Viola, Vitis and *Zizia.*

Tetralonia speciosa (Cresson)

Melissodes speciosa Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 198. ♀.
Melissodes dilecta Cresson, 1878. Acad. Nat. Sci. Phila. Proc. 30, p. 199. ♂. New synonymy.

This species is nearly idential with *T. hamata* Bradley, and the two have been confused in the past. The type specimen of *speciosa* has been compared with the female of *hamata,* and the type of *dilecta* with the male. The only apparent difference is the form of the hind tibial spurs in both sexes, these being straight and simple in *speciosa,* not at all curved or reflexed apically. There is also an apparent difference in the range, although this may have resulted from an insufficient amount of material. The type locality of *speciosa* is Colorado, and all of the specimens seen by this writer have been from the West, while all specimens from the East have been *hamata.* A more thorough study of the distribution of these two forms is needed.

Tetralonia illinoensis (Robertson)

Synhalonia illinoensis Robertson, 1902. Canad. Ent. 34, p. 49. ♂.
Tetralonia illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

No specimens of this species have been collected or received from other collectors, and the only one seen is the holotype male in the Robertson collection in the Illinois Natural History Survey. The following brief note was made during an examination of the specimen: Resembles the male of *atriventris,* but basal segment of flagellum nearly half the length of segment 2; clypeus entirely yellow, this color invading slightly the supraclypeal area; 2nd submarginal cell broader than long, and 1st recurrent vein joins this cell about one-third from its apex. In *atriventris* the length and breadth of the 2nd submarginal cell are about equal, and it is joined by the 1st recurrent vein near the middle.

DISTRIBUTION—Illinois.

FLOWER RECORD—Robertson (1929) records *illinoensis* only on *Lithospermum canescens.*

Possibly this is a variant of *T. belfragei.*

Tetralonia rosae (Robertson)

(Fig. 89)

Synhalonia rosae Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 54. ♀.
Tetralonia fedoris Cockerell, 1906. Amer. Ent. Soc. Trans. 32. ♂.
Tetralonia rosae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 13-15 mm., breadth of abdomen 5-5.5 mm.; black, spurs pale yellowish, tegulae yellowish-hyaline; wings very lightly and uniformly infuscated, veins testaceous to piceous, recurrent veins reaching 2nd and 3rd submarginal cells subequally distant from their tips; cheeks very slightly narrower than eyes; clypeus slightly protuberant, its median length slightly less than half the distance between eyes; eyes subparallel; mandibles simple or obscurely bi-dentate apically; basal segment of flagellum not quite equalling segments 2 and 3 combined in length; tibial spurs straight and simple; punctures of clypeus coarse and close, those on labrum much finer and crowded medially, becoming rather coarse and sparse laterally; supraclypeal area rather sparsely punctate, surface laterally with rather fine and close punctures, those above antennae close across entire width of face; cheeks somewhat shining, punctures fine, slightly separated; scutum shining, median punctures quite coarse and well separated but hardly sparse, becoming fine and close around periphery; scutellum with much finer and very close punctures throughout; pleura dull, punctures fine and close throughout; posterior face of propodeum rather dull, punctures rather sparse on each side, dorsal area becoming rather coarsely rugose along upper margin, becoming more definitely striate at each extreme side, lateral faces dull, punctures rather fine, shallow and obscure; discs of abdominal terga quite closely punctate across basal areas, rather coarsely so on basal tergum, apical impressed areas shining and impunctate on 1 and 2, punctures very fine and quite sparse on 3, and rather close and minute on 4; pygidium subtriangular, with narrowly rounded apex; pubescence copious and elongate, entirely pale ochraceous on head, largely so on thorax, but with a few darker hairs in center of scutum posteriorly; legs largely pale pubescent basally, becoming somewhat darker apically, brownish on front tarsi beneath and

on outer surface of mid tibiae, that on basitarsi more fuscous, hind tibial scopa fuscous to blackish; basal abdominal tergum with rather copious, erect, pale ochraceous pubescence basally, disc with very short, subappressed, blackish pubescence toward each side but largely bare medially; following terga with only very short, inconspicuous, subappressed, dark pubescence, becoming somewhat brownish apically on tergum 5, fuscous on each side of tergum 6.

MALE—Length 10.5-13.5 mm., breadth of abdomen 4-5 mm.; black, the clypeus and labrum entirely yellow, mandibles entirely black, legs black, apical tarsal segments becoming more testaceous, spurs pale yellowish, tegulae yellowish-hyaline; wings subhyaline, veins pale testaceous to piceous, recurrent veins reaching 2nd and 3rd submarginal cells subequally distant from apex; cheeks slightly narrower than eyes; clypeus slightly protuberant, its median length slightly greater than half the distance between eyes; eyes subparallel; mandibles simple or obscurely bi-dentate at apex, becoming more or less testaceous apically; shorter side of basal segment of flagellum only very slightly longer than pedicel, segment 2 about five times longer; tibial spurs straight and simple; clypeal punctures quite coarse and deep, rather close along upper margin, becoming more definitely but not widely separated below and laterally, those on labrum much finer and quite close, becoming somewhat more sparse at extreme sides; supraclypeal area dull, rather irregularly and sparsely punctate, lateral areas below antennae with quite close and fine punctures, those above antennae very close throughout; cheeks somewhat shining, punctures shallow but fine and rather close; median posterior area of scutum shining, rather coarsely punctate, punctures well separated but not sparse over a limited area, becoming finer and quite densely crowded over anterior half and more narrowly on lateral and posterior margins; scutellum shining anteriorly, punctures rather fine and close, becoming crowded laterally and posteriorly; pleura dull, punctures very fine and close throughout; posterior face of propodeum rather dull, punctures shallow but rather close and irregular, dorsal face becoming more rugose along upper margin, striate at extreme sides, lateral faces closely and finely punctate; abdominal terga somewhat shining, punctures rather deep and distinct, rather coarse on basal tergum, well separated medially, becoming much finer and closer laterally, and much more sparse toward the very narrow, impunctate, apical margin; apical impressed areas of terga 2-5 well punctured, but punctures somewhat more sparse than on basal areas, apical margins very narrowly impunctate; tergum 6 very finely and rather densely punc-

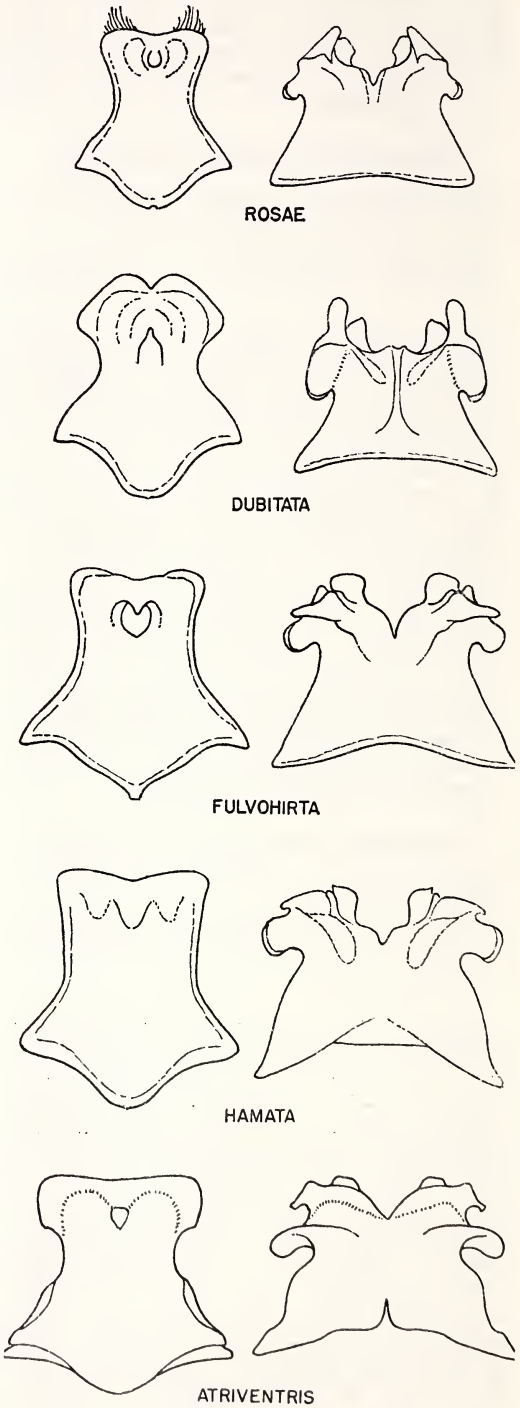


Figure 89
Sterna 7 (right) and 8 in males of *Tetralonia*.

tate throughout; pubescence of head, thorax and basal abdominal tergum long, copious and erect, pale ochraceous, becoming rather bright fulvous on thorax above, and legs entirely pale pubescent; tergum 2 with an intermixture of very short, dark and light hairs across basal half, forming an obscure, pale pruinose band, apical half covered with suberect, rather elongate, black hairs; terga 3-6 with erect but rather short black hairs across basal areas, the impressed apical margins bearing some thin pale tomentum that forms obscure, barely evident, thin fasciae, apical margin of 6 with a fringe of intermixed light and dark hairs; median length of pygidial plate considerably greater than basal width, margins carinate, converging toward the rather narrowly rounded apex; sterna 7 and 8 as shown (fig. 89); genital armature much as in *atriventris* (fig. 88), but gonostyli short pubescent toward base.

DISTRIBUTION — Missouri to Ohio, Virginia and Florida, April to June.

FLOWER RECORDS — *Batodendron, Diospyros, Eleagnus, Linaria, Melilotus, Pentstemon, Rubus* and *Stachys*. Robertson (1929) records *rosae* also on *Asclepias, Blephilia, Cornus, Dianthera, Geranium, Houstonia, Hydrophyllum, Iris, Monarda, Rosa* and *Trifolium*.

Anthophora Latreille

(Fig. 67)

Lasius Panzer [1801-1802]. Faunae Ins. German., 86, no. 16. Name suppressed by Internatl. Comm. Zool. Nomencl., Op. 151. 1944.

Podalirius Latreille, 1802. Hist. Nat. Fourmis, p. 430. Name suppressed by Internatl. Comn. Zool. Nomencl., Op. 151, 1944.

Anthophora Latreille, 1803. Nouv. Dict. Hist. Nat. 18, p. 167. Type: *(Apis pilipes* Fabricius) = *Apis acervorum* Linnaeus. Desig. by Internatl. Comn. Zool. Nomencl., Op. 151, 1944.

Clisodon Patton, 1879. U. S. Geol. and Geog. Survey Bul. 5, p. 479. Type: *(Anthophora terminalis* Cresson) = *Anthophora furcata terminalis* Cresson. Monob. and orig. desig.

Podalirius subg. *Amegilla* Friese, 1897. Die Bienen Europas 3, p. 18. Type: *Apis quadrifasciata* Villers. Desig. by Cockerell, 1931.

Podalirius subg. *Paramegilla* Friese, 1897. Die Bienen Europas 3, p. 18. Type: *Apis ireos* Pallas. Desig. by Sandhouse, 1943.

Anthophoroides Cockerell and Cockerell, 1901. Ann. Mag. Nat. Hist. (7) 7, p. 48. Type: *Podalirius vallorum* Cockerell. Monob. and orig. desig.

Anthemoëssa Robertson, 1905. Amer. Ent. Soc. Trans. 31, p. 372. Preocc. Type: *Anthophora abrupta* Say. Monob. and orig. desig.

Anthophora subg. *Micranthophora* Cockerell, 1906. Amer. Ent. Soc. Trans. 32, p. 66. Type: *Anthophora curta* Provancher. Orig. desig.

Alfkenella Börner, 1919. Biol. Zentbl. 39, p. 168. Type: *Apis quadrifasciata* Villers. Orig. desig.

Melea Sandhouse, 1943. U. S. Natl. Mus. Proc. 92, p. 526. (new name)

These are robust, hairy bees, the clypeus black in the females, yellow in the males. In the front wings the stigma is very small, the marginal cell short, and there are three submarginal cells. The marginal cell extends somewhat beyond the 3rd submarginal, the latter only slightly longer than the 2nd, the 1st somewhat longer. The scopal hairs on the hind tibiae and basitarsi are simple, those on the tibiae longer than those on the basitarsi.

KEY TO SPECIES

Females

1. Mandibles tri-dentate apically .... *terminalis* Cresson (p. 328)
   Mandibles bi-dentate at apex 2
2. Abdomen with conspicuous, apical, whitish, integumental bands .... *walshii* Cresson (p. 330)
   Abdomen unbanded 3
3. First segment of flagellum longer than segments 2-5 combined .... *ursina* Cresson (p. 327)
   Basal segment of flagellum at most no longer than segments 2-4 combined .. 4
4. Pale pubescence of abdomen limited to basal tergum .. *abrupta* Say (p. 324)
   At least segments 1 and 2 pale pubescent 5
5. Pale pubescence covering abdominal terga 1-3 ..... *bomboides* Kirby (p. 325)
   Third abdominal tergum entirely black pubescent ..... *raui* Rohwer (p. 326)

Males

1. Hind basitarsi straight and simple, not at all angulate 2
   Hind basitarsi conspicuously angulate on anterior margin 4
2. Abdominal terga with conspicuous apical, whitish, integumental bands .... *walshii* Cresson (p. 330)
   Abdominal terga entirely black 3

3. Clypeus entirely yellow; hind basitarsi shorter than tarsal segments 2-5; basal segment of flagellum shorter than scape ..... *terminalis* Cresson (p. 328)
   Clypeus with limited black areas; hind basitarsi subequal in length to the following segments combined; basal segment of flagellum longer than scape .. .. *ursina* Cresson (p. 327)

4(1). Pale pubescence of abdomen limited to the basal tergum *abrupta* Say (p. 324)
   Pubescence of tergum 2 entirely pale . 5

5. Face with large yellow maculae laterad of the clypeus; thorax entirely pale pubescent; tergum 3 entirely black pubescent ..... *raui* Rohwer (p. 326)
   Face with lateral maculae reduced to mere lines parallel to clypeal margin; scutum with a posterior patch of black pubescence; tergum 3 with considerable pale pubescence .... *bomboides* Kirby (p. 325)

Anthophora (Anthophora) abrupta Say

(Figs. 90-92)

Anthophora abrupta Say, 1837. Boston Jour. Nat. Hist. 1, p. 409. ♂.

Anthophora sponsa Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 339. ♀.

Anthophora sponsa Walsh, 1868. Amer. Ent. 1, p. 9. (biology)

Anthophora abrupta Ashmead, 1894. Psyche 7, p. 25. (biology)

Anthophora abrupta Frison, 1922. Amer. Ent. Soc. Trans. 48, pp. 137-156. (biology)

Anthophora abrupta Rau, 1922. Acad. Sci. St. Louis, Trans. 24 (7), p. 35. (biology)

Anthophora abrupta Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 166. (biology)

Anthophora abrupta Rau, 1929. Jour. Compar. Psychol. 9, p. 53. (biology)

Anthophora abrupta Rau, 1929. Psyche 36, p. 156. (biology)

Anthemoessa abrupta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower record)

Anthophora abrupta Rau, 1931. Jour. Compar. Psychol. 12, p. 257. (biology)

Anthophora abrupta Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1080, figs. 232 and 233. (larva)

FEMALE—Length 14.5-17 mm., breadth of abdomen 5.5-6.5 mm.; black, legs brownish-piceous to blackish, spurs black or piceous, tegulae brownish to piceous; wings subhyaline, faintly clouded apically, veins brownish to piceous; cheeks about equal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below (fig. 90); eyes very slightly convergent below; mandibles with a distinct, inner, subapical tooth; basal segment of flagellum as long as segments 2 and 3 combined; clypeus rather dull, the more median punctures rather shallow and well separated, becoming closer along lateral and upper margins; punctures quite coarse in general below level of antennae, becoming very fine and close above antennae and on cheeks; punctures very fine and close over most of thorax, but somewhat separated in center of scutum, shallow and more distinctly separated on propodeum, its posterior face smooth and impunctate along mid-line; abdominal terga very finely and closely punctate throughout, surface dull; pygidium narrow and elongate, narrowly rounded at apex; pubescence of head largely blackish, more or less intermixed with pale ochraceous hairs on vertex and around antennae; pubescence of thorax largely pale ochraceous, lateral faces of propodeum with some fuscous or blackish pubescence, and legs chiefly black pubescent, hind tibial scopa fuscous to black, hairs simple; abdominal terga quite densely covered with very short but erect black pubescence, basal tergum with some intermixed pale hairs on anterior face.

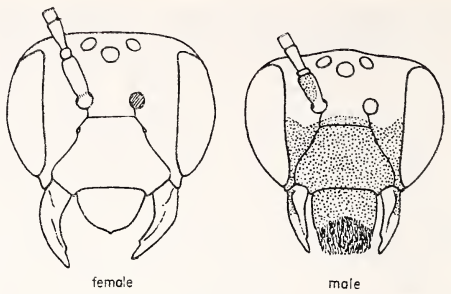


Figure 90
Facial view of head in both sexes of *Anthophora abrupta*.

MALE—Length 12-17 mm., breadth of abdomen 5-6 mm.; black, clypeus entirely, mandibles at base, basal half of labrum, anterior face of antennal scape, lateral facial maculae, and inferior margin of supraclypeal area, yellow (fig. 90); apical third of labrum black, densely covered with pubescence; legs and spurs piceous to black; tegulae brownish-piceous; wings subhyaline, veins brownish to piceous; cheeks about equal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes subparallel; median length of labrum about equal to the breadth;

basal segment of flagellum only very slightly longer than segment 2, about equal to segment 3; hind basitarsi strongly angulate on lower margin; maculated areas of face and clypeus with shallow, rather fine punctures, well separated on clypeus medially, black areas of face above very finely and densely punctate; cheeks somewhat more shining but with very fine, somewhat separated punctures; posterior median area of scutum shining and sparsely punctate, and propodeum somewhat shining, punctures slightly separated although fine and obscure, otherwise thorax very finely and densely punctate; the more basal abdominal terga very finely and densely punctate, punctures becoming more minute but quite sparse and less definite on the more apical terga; pubescence of cheeks, vertex and lateral faces of propodeum more or less fuscous, otherwise pale ochraceous on head and thorax; basal abdominal tergum with considerable long, erect, pale pubescence, that on the following terga short but dense and erect, fuscous to blackish; legs largely black or fuscous pubescent, but front legs more or less fringed posteriorly with elongate pale hairs; apical margin of tergum 7 carinate, rather broadly incurved, the resulting pair of angles subacute; sterna 7 and 8 and genital armature as shown (figs. 91 and 92).

DISTRIBUTION — Illinois and Michigan to New York, south to Louisiana and Florida, March to September.

FLOWER RECORDS—*Azalea, Cirsium, Oenothera, Pentstemon, Rubus* and *Vicia.* Robertson (1929) records this species on the following additional genera: *Aesculus, Asclepias, Blephilia, Convolvulus, Cornus, Delphinium, Dianthera, Diospyros, Frasera, Gillenia, Hydrophyllum, Iris, Leonurus, Melilotus, Mertensia, Monarda, Nepeta, Pastinaca, Polygonatum, Rosa, Scutellaria, Stachys, Teucrium, Trifolium* and *Triosteum.*

Anthophora (Anthophora) bomboides bomboides Kirby

(Fig. 92)

Anthophora bomboides Kirby, 1837. *In* Richardson, Faune Bor.-Amer. 4, p. 271. ♂.

Anthophora canadensis Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 292. ♂.

FEMALE—Length 14-14.5 mm., breadth of abdomen 5.5-6 mm.; black in general, legs somewhat more piceous, mid and hind spurs brownish-piceous, and hind tarsi becoming somewhat brownish; wings lightly and rather uniformly infuscated, veins piceous; mandibles with a distinct, inner, subapical tooth; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length very slightly greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum much longer than segments 2 and 3 combined, nearly equal to segments 2-4; labrum considerably broader than its median length; cheeks and upper part of face with very fine and densely crowded punctures, these becoming somewhat coarser below level of antennae, quite coarse and well separated on clypeus, and very coarse and irregular on labrum medially; punctures in median area of scutum posteriorly fine and very sparse, the scutum, scutellum and pleura otherwise finely and densely punctate throughout; propodeum somewhat more shining, impunctate along median area of posterior face, otherwise punctures rather coarse and distinct, somewhat separated; punctures on the more basal abdominal terga very close, rather fine but distinct, becoming somewhat more shallow and indistinct but more widely separated on the more apical terga, apical margins narrowly smooth and impunctate; pygidium elongate, slightly narrowed apically, apex narrowly rounded; pubescence of head copious and elongate, largely black, with pale hairs around antennae and ocelli and across vertex; scutum with some inconspicuous fuscous or black hairs in the median, sparsely punctate area, and venter of thorax with some black pubescence beneath, otherwise thorax with copious, dense, pale ochraceous pubescence; legs chiefly black pubescent, but front femora fringed posteriorly with long pale hairs; abdominal terga 1-3 entirely covered with copious, rather short, pale ochraceous pubescence, that on the remaining terga black.

MALE—Length 13.5-14.5 mm., breadth of abdomen 4.5-5.5 mm.; black, clypeus entirely yellow and face narrowly yellow along its lateral and upper margins; labrum broadly yellow, but with some black at lateral angles and along apical margin; mandibles with a small basal yellow maculation; antennal scape with a small anterior, subapical, yellow maculation; tegulae and legs largely black, tarsal segments somewhat tinged with brownish or piceous, spurs brownish-piceous; wings subhyaline to very faintly brownish, veins brownish to piceous; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum slightly shorter than segments 2 and 3 combined; hind basitarsi dilated at base, with a strong, subacute, inferior angle; upper part

of face very finely and densely punctate, punctures becoming more distinct and coarse below, those on clypeus becoming quite sparse but rather shallow and vague apically, irregular but quite coarse on labrum; median area of scutum posteriorly very minutely and sparsely punctate, the scutum, scutellum and pleura otherwise very finely and densely punctate, propodeum somewhat more deeply and distinctly so, the punctures slightly separated, rather coarse, but shallow and sparse on lateral faces, median area of posterior face narrowly impunctate; punctures of abdominal terga very fine, quite close but distinct on the more basal terga, becoming minute and more sparse on the more apical terga, apical margins rather broadly impunctate; face largely pale pubescent, hairs long and erect, cheeks pale pubescent beneath, becoming blackish or fuscous above, and with intermixed black hairs across vertex and below ocelli; scutum with a median, posterior patch of black pubescence, thorax otherwise entirely covered with dense, copious and erect, pale ochraceous pubescence; legs largely black pubescent, but front femora and tibiae fringed posteriorly with elongate, pale hairs; terga 1-3 largely or entirely covered with dense, erect, quite copious, pale ochraceous pubescence, that on the more posterior terga elongate, darker but thinner, becoming pale at extreme sides; apical margin of tergum 7 subcarinate, broadly but rather deeply emarginate, the two resulting angles subacute; sterna 7 and 8 as shown (fig. 92); genital armature similar to *abrupta* (fig. 91).

DISTRIBUTION — Michigan to Maine, south to Georgia, June to August.

FLOWER RECORDS — *Ceanothus* and *Pentstemon.*

The recognition of several subspecific forms of *bomboides* in the West necessitates the subspecific designation of this typical form.

Anthophora (Anthophora) raui Rohwer

Anthophora raui Rohwer, 1923. Ent. Soc. Wash. Proc. 25, p. 100.

Anthophora (Anthemöessa) raui Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 179. (biology)

Anthophora raui Rau, 1929. Psyche 36, p. 555. (biology)

Anthophora raui Rau, 1931. Jour. Compar. Psychol. 12, p. 257. (biology)

FEMALE—Length 12.5-14.5 mm., breadth of abdomen 5-5.5 mm.; black, the more apical flagellar segments reddish-piceous beneath, tegulae and legs largely black, the more apical tarsal segments somewhat more piceous, and spurs piceous; wings very lightly infuscated, veins piceous to black; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length very slightly greater than half the distance between eyes below; eyes very slightly convergent below; mandibles with a low, inner, subapical angle or tooth; width of labrum considerably greater than its median length; basal segment of flagellum slightly exceeding segments 2 and 3 combined in length; face very finely and densely punctate, punctures of clypeus considerably coarser and deeper, becoming somewhat separated toward apical margin, those on labrum very coarse and irregular; cheeks with rather deep and distinct but quite fine and close punctures; median area of scutum posteriorly shining and impunctate over a limited area, the scutum, scutellum and pleura otherwise finely and very closely punctate; propodeum somewhat more deeply and distinctly punctate, posterior surface somewhat shining, punctures rather sparse, lateral faces dull, punctures quite close in general; the more basal abdominal terga quite finely and closely punctate, but punctures rather deep and distinct, becoming more sparse on the more apical terga; pygidium narrow and elongate, tip narrowly rounded; pubescence of head largely blackish or fuscous, with some intermixed pale hairs between antennae and on vertex, cheeks below with some very long pale hairs; scutum with a median black patch of erect hairs posteriorly, thorax otherwise quite densely covered with copious, pale ochraceous pubescence; abdominal terga 1 and 2 quite copiously pale ochraceous pubescent, more elongate on the basal segment, somewhat shorter on 2, short and fuscous on 3-5; pubescence of legs largely black, anterior femora with some pale hairs in the posterior fringe.

MALE—Length 13-15 mm., breadth of abdomen 4.5-5.5 mm.; black, clypeus entirely yellow; labrum largely yellow, but black laterally and very narrowly across apical margin; supraclypeal area with an apical, yellow strip adjacent to margin of clypeus, and lateral areas of face adjacent to clypeus more or less completely yellow maculated; antennal scape and base of mandibles yellow maculated or not; legs black, spurs fuscous to blackish; tegulae brownish-piceous; wings subhyaline basally, becoming faintly clouded apically, veins piceous to black; mandibles slender and simple; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; basal segment of flagellum about

equal to segments 2 and 3 combined; hind basitarsi strongly dilated at base, acutely angulate beneath; black areas of face above very finely and densely punctate, surface dull, maculated areas below much more distinctly punctate, the punctures becoming rather irregular and somewhat sparse on clypeus apically, those on labrum quite coarse but rather close and irregular; a limited median area of scutum posteriorly somewhat shining and sparsely punctate, otherwise scutum, scutellum and pleura very finely and densely punctate; propodeum somewhat more shining, deeply and distinctly punctate, rather sparsely so on posterior face, rather closely so on lateral faces; punctures of abdominal terga fine, close and quite distinct, becoming rather sparse and irregular on the more apical terga; head with quite copious and elongate, pale pubescence, more yellowish above, whitish below, sometimes fuscous or blackish on upper part of cheeks, and with intermixed dark hairs around ocelli and across vertex; scutum posteriorly usually with some intermixture of black hairs in the generally light pubescence, thorax otherwise quite copiously covered with elongate, pale ochraceous pubescence; legs black pubescent in general, but front pair fringed posteriorly with pale hairs, and mid and hind coxae and trochanters with considerable pale pubescence; abdominal terga 1 and 2 densely covered with pale ochraceous pubescence, that on 3-7 entirely fuscous or blackish; tergum 7 subcarinate apically, with a broad but deep, somewhat rounded emargination, the two resulting lateral projections narrowly rounded; sterna 7 and 8 resembling those in *bomboides* (fig. 92); genital armature as in *abrupta* (fig. 91).

DISTRIBUTION — Colorado to New York, May to July.

Anthophora (Anthophora) ursina ursina Cresson

(Figs. 91 and 92)

Anthophora ursina Cresson, 1869. Amer. Ent. Soc. Trans 2, p. 291. ♂.

Anthophora pyralitarsis Dours, 1869. Soc. Linn. Nord France, Mem. 2, p. 160. ♂.

Anthophora ursina Robertson, 1905. Amer. Ent. Soc. Trans. 31, p 372. ♀ ♂.

Anthophora ursina Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Anthophora ursina ursina Timberlake, 1951. N. Y. Ent. Soc. Jour. 59, p. 57 (synonymy)

FEMALE—Length 15-16 mm., breadth of abdomen 6.5 mm.; black, antennal flagella somewhat more piceous beneath, legs black, spurs and tegulae piceous; wings uniformly, lightly infuscated, veins brownish to piceous; cheeks about equal to eyes in width; clypeus strongly protuberant, its median length about equal to half the distance between eyes below; mandibles with a low, subapical, inner tooth; median length of labrum about equal to basal width; eyes subparallel; basal segment of flagellum equal in length to segments 2-5 combined; face around and above antennae very finely and densely punctate, a limited shining area adjacent to lateral ocelli impunctate; clypeus quite coarsely and rather closely punctate, punctures becoming minute, irregular and vague apically, labrum rather coarsely reticulate; scutum dull and very densely tessellate, punctures fine, shallow, rather sparse in central area posteriorly, becoming much finer and closer laterally, fine and crowded on scutellum; pleura dull, punctures very fine and close; propodeum dull, rather smooth, punctures shallow, irregularly scattered, rather coarse on each side, lateral surfaces more shining, punctures rather shallow but distinct; punctures of abdominal terga very fine and quite close, becoming more widely separated on tergum 3, and to a lesser degree on 4; pygidium narrow at base, elongate, apex rather broadly rounded; pubescence of head entirely black, that on scutum, scutellum, propodeum, and pleura largely pale ochraceous above, long and copious, with a few scattered, dark hairs on scutum, black in large part on legs, pleura below and lateral faces of propodeum; hind tibial scopa of elongate, slender, relatively simple, black hairs; basal abdominal tergum with copious, elongate, pale ochraceous pubescence, this short and dark laterally, that on the remaining terga short but rather dense, erect and blackish or fuscous throughout.

MALE—Length 14.5-16 mm., breadth of abdomen 5.5-6.5 mm.; black, labrum largely yellow, clypeus yellow apically, with a narrow median yellow line reaching upper margin; lateral yellow maculae very narrowly produced along eye margin about to level of antennae; supraclypeal area very narrowly yellow along margin of clypeus; antennal scape yellow anteriorly; legs largely black, hind tarsi somewhat reddened, spurs fuscous to blackish; tegulae brownish-piceous; wings uniformly, very lightly infuscated, veins piceous to black; cheeks slightly narrower than eyes; clypeus strongly protuberant, its median length equal to about half the distance between eyes below; eyes subparallel; length and breadth of labrum about equal; mandibles with a distinct, inner, subapical tooth; basal segment of flagellum about equal to segments 2-4 combined; hind basitarsi slender and parallel-sided; median and upper areas of face very finely and

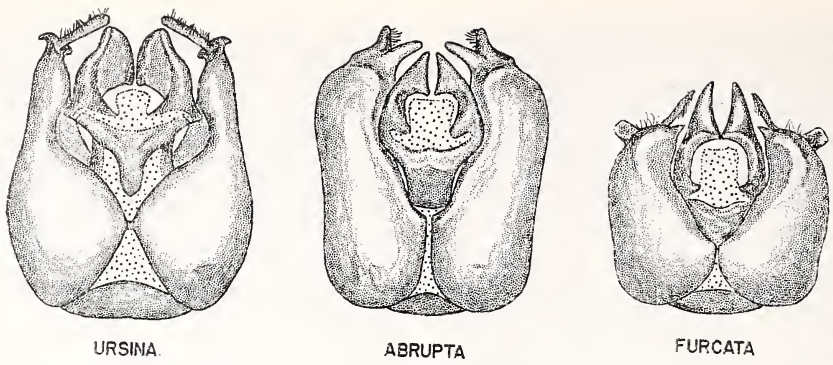


Figure 91—Genital armatures in males of *Anthophora*.

densely punctate, becoming sparsely and minutely so below on each side of clypeus, the clypeal punctures fine and well separated medially, becoming somewhat closer laterally, apical punctures quite close; labrum shining, punctures very minute, irregularly scattered and sparse; cheeks dull, punctures very fine, close and obscure; vertex smooth and polished adjacent to each lateral ocellus, this area impunctate; scutum dull and densely tessellate, median posterior area nearly impunctate, the anterior and lateral areas very finely and densely punctate; scutellum finely and densely punctate except narrowly along anterior margin; pleura dull, very finely and densely punctate throughout; posterior face of propodeum rather dull, punctures fine and close, dorsal triangle somewhat smoother, with sparse, scattered, shallow punctures, lateral faces dull, very finely and closely punctate; basal abdominal tergum with fine, quite close and deep punctures, those on the following terga minute and more widely separated, becoming somewhat coarser, deeper and closer laterally, well separated but hardly sparse medially, fine and crowded on tergum 7; pubescence largely whitish on head, with scattered, erect, fuscous or backish hairs across vertex and along lateral margins of face; scutum with generally pale pubescence but with numerous, scattered, intermixed dark hairs, that on scutellum, propodeum and pleura entirely whitish; pubescence of legs blackish in large part, but anterior trochanters and femora fringed posteriorly with long pale hairs; basal abdominal tergum with copious, elongate, pale ochraceous pubescence, following terga with short but erect, quite copious, black pubescence; tergum 7 narrowly produced medially, this process shallowly emarginate; sterna 7 and 8 and genital armature as shown (figs. 91 and 92).

DISTRIBUTION — New York and the New England states, south to Georgia, March to June.

FLOWER RECORDS — *Azalea, Pedicularia, Pentstemon, Vaccinium* and *Vicia.* Robertson (1929) records *ursina* on the following: *Aesculus, Asclepias, Astragalus, Cercis, Collinsia, Delphinium, Dicentra, Dodecatheon, Geranium, Lithospermum, Lonicera, Mertensia, Monarda, Phlox, Physalis, Polygonatum, Polymonium, Ribes, Scutellaria, Trifolium* and *Viola.*

The subspecific designation of *ursina* results from recognition of two additional subspecies found in the West.

Anthophora (Clisodon) furcata terminalis Cresson

(Figs. 91 and 92)

Anthophora terminalis Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 292. ♀ ♂.

Ceratina bidentata Provancher, 1882. Nat. Canad. 13, p. 234. ♂. New synonymy.

Anthophora nudata Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 336. ♂. New synonymy.

Anthophora subglobulosa Provancher, 1888. Addit. Corr. Faune Ent. Canad, Hym. 2, p. 297. ♂. New synonymy.

Anthophora nubiterrae Viereck, 1903. Amer. Ent. Soc. Trans. 29, p. 45. ♂.

Anthophora terminalis W. P. Cockerell, 1903. Birds and Nature 14, p. 127. (biology)

Clisodon terminalis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11-13.5 mm., breadth of abdomen 4.5-5 mm.; black, including antennae and legs, spurs more piceous, apical tarsal segments becoming somewhat brownish; tegulae brownish to piceous; wings lightly infuscated, veins brownish to piceous; cheeks slightly narrower than eyes; clypeus moderately protuberant, its median length slightly great-

er than half the distance between eyes below; eyes very slightly convergent below; mandibles distinctly tridentate apically, the median tooth more elongate; basal segment of flagellum fully equal to segments 2-4 combined; labrum somewhat broader than its median length; surface of face dull, punctures on median area very fine and close, becoming more shallow, indistinct and rather sparse above, minute, close and indistinct on cheeks, considerably coarser, deeper and quite close on clypeus, the labrum more irregularly reticulate; scutum rather smooth but dull, punctures very shallow, obscure and very sparse medially, becoming much closer but very obscure peripherally, those on scutellum very shallow, vague and rather close; pleura dull and densely tessellate, punctures very shallow and vague, hardly evident; propodeum dull and tessellate, punctures of posterior face quite distinct and rather close, lateral faces dull but rather smooth, nearly impunctate; abdominal terga rather smooth but dull, median punctures very vague and indistinct, becoming somewhat more distinct laterally, fine and rather widely separated in general, becoming somewhat closer on tergum 5, apical margins of all rather narrowly impunctate; pygidium rather broad at base, narrowly produced apically, tip subacute; pubescence of face below level of antennae, and lower part of cheeks largely pale and quite dense, upper part of cheeks, vertex and face above antennae with erect, fuscous pubescence, a few dark hairs between antennae and eye margins below; scutellum and much of scutum with erect fuscous pubescence, that on anterior third of scutum erect and cream-colored, dense and entirely pale on pleura and propodeum; pubescence of legs pale in large part, some dark hairs on fore and mid tibiae and on tarsi beneath, hind tibial scopa whitish; basal abdominal tergum with rather thin but elongate, whitish pubescence, a few dark hairs across the disc medially; terga 2-4 with rather sparse, short, erect pubescence which is dark medially, becoming light laterally; tergum 5 quite copiously covered with rather short, dense, orange pubescence.

MALE—Length 10-12.5 mm., breadth of abdomen 4-5 mm.; black, clypeus entirely yellow, labrum largely yellow, the apical rim and spots on lateral angles above, dark; margin of supraclypeal area adjacent to clypeus very narrowly yellow, and lateral yellow maculae narrowly produced along eye margin to level of antennae; antennal scape entirely black or with small yellow maculations; legs black, apical tarsal segments becoming somewhat brownish-testaceous, spurs dull testaceous, tegulae piceous; wings subhyaline, or very faintly brownish, veins piceous to black; cheeks subequal to eyes in width; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; median length of labrum about two-thirds the breadth; mandibles tridentate apically; basal segment of flagellum equal to segments 2 and 3 combined; hind basitarsi slender and unmodified; median area of face finely and densely punctate, punctures becoming more shallow, sparse and obscure above, coarser and deeper below, those on clypeus slightly but not widely separated, quite obscure on the yellow surface, quite deep and distinct on labrum, becoming sparse at extreme sides; cheeks with very minute, obscure but rather close punctures, becoming somewhat deeper and more distinct posteriorly; scutum quite smooth but dull medially, with sparse, very fine, scattered punctures, becoming somewhat coarser and closer but very shallow around periphery; scutellum dull, densely tessellate, closely but very obscurely punctate; pleura tessellate, punctures very shallow, slightly separated in median area, becoming minute and sparse anteriorly where the surface is shining, especially above front coxae; posterior face of propodeum rather dull but smooth, punctures rather close and shallow, becoming more minute and indefinite on lateral faces; abdominal terga somewhat shining, punctures minute and quite close on basal tergum, more widely separated on following terga, becoming quite sparse on 3-6; pubescence of face and lower half of cheeks long and erect, pale yellowish or white, cheeks above, vertex and area below ocelli with long, erect fuscous hairs; posterior two-thirds of scutum and anterior half of scutellum with erect, rather copious, fuscous pubescence, that on thorax otherwise more whitish, entirely pale on legs; basal abdominal tergum rather copiously covered with elongate pale hairs, discs of the following terga with shorter but erect and largely dark hairs, becoming quite elongate on the more apical terga, margins of 2-5 with thin, indefinite and very narrow, apical fasciae that are widely interrupted medially, sometimes not evident; tergum 7 narrowly produced medially, this process triangularly emarginate, the resulting pair of projections rather narrowly rounded; sterna 7 and 8 and genital armature as shown (figs. 91 and 92).

DISTRIBUTION — Alberta to Maine, south to North Carolina, May to September.

FLOWER RECORDS — *Medicago*, *Pentstemon* and *Salvia*. Robertson (1929) also lists *Blephilia*, *Monarda*, *Prunella*, *Rosa* and *Scutellaria*.

Typical *furcata* is Palearctic in distribution and does not occur in North America.

Anthophora (Amegilla) walshii Cresson

(Fig. 93)

Anthophora walshii Cresson, 1869. Amer. Ent. Soc. Trans. 2, p. 290. ♂ ♀.

Amegilla walshii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 14-16 mm., breadth of abdomen 5.5-6.5 mm.; black, the antennae black, legs piceous to black, spurs and tegulae brownish-piceous; wings subhyaline, veins brownish to piceous; apical margin of basal abdominal tergum narrowly ivory and the rather narrow, apical, impressed areas of terga 2-4 ivory, in marked contrast to the otherwise black integument; cheeks slightly narrower than eyes; clypeus only slightly protuberant, its median length about half the distance between eyes below; labrum somewhat broader than the median length; mandible with a distinct, inner, subapical tooth; eyes very slightly convergent below; basal segment of flagellum only slightly shorter than segments 2-4 combined; punctures of face laterally fine and densely crowded, becoming very minute and vague above, the more median punctures much coarser and quite close; clypeus with rather coarse punctures above, these becoming much finer and closer laterally and apically; labrum rather finely and irregularly reticulate or rugose; cheeks rather smooth but dull, punctures exceedingly minute and obscure but rather close; scutum dull and densely tessellate, without evident punctures, and scutellum largely impunctate medially, becoming rather finely, obscurely and closely punctate laterally; pleura dull and tessellate, without evident punctures; posterior face of propodeum somewhat more shining, with exceedingly minute, rather vague and close punctures, lateral faces dull and tessellate, punctures hardly evident; basal abdominal tergum dull, very minutely and densely punctate beneath the pubescence; terga 2-5 dull but quite smooth, punctures exceedingly minute, hardly visible, well separated but hardly sparse; pygidium narrowly triangular, apex narrowly rounded; clypeus and supraclypeal area with numerous, rather short but erect, dark hairs, the pubescence on face laterally and above, and on cheeks quite copious and elongate, rather yellowish above, whitish below; entire thorax rather densely covered with pale pubescence, that on dorsum rather short, pale yellowish, becoming more elongate and whitish below; pubescence very long and dense on propodeum laterally, behind wing bases; legs largely blackish or dark pubescent, but front

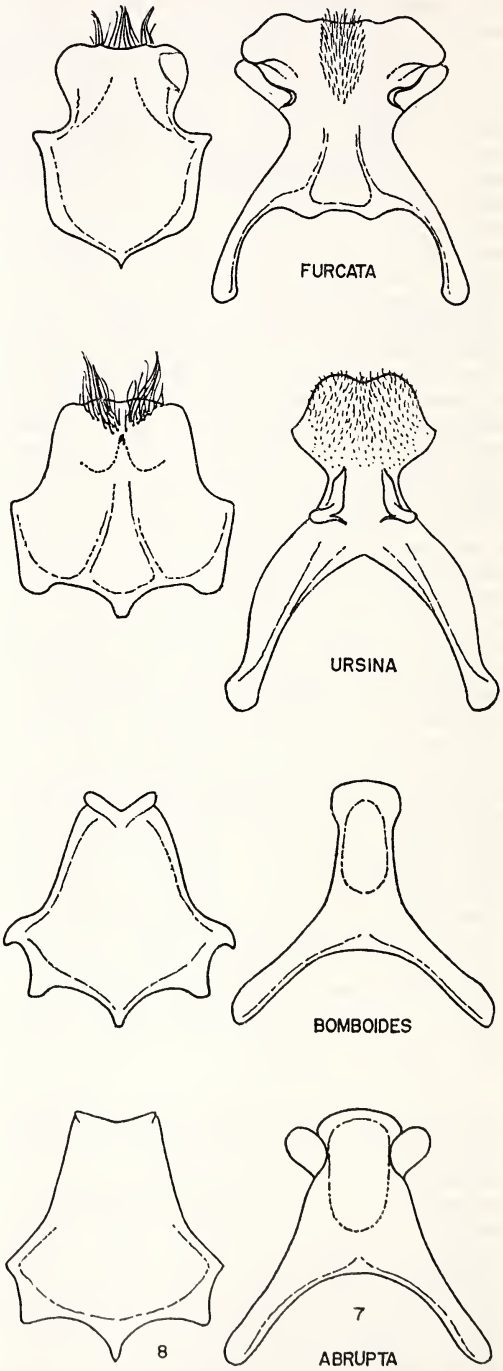


Figure 92
Sterna 7 and 8 in males of *Anthophora*.

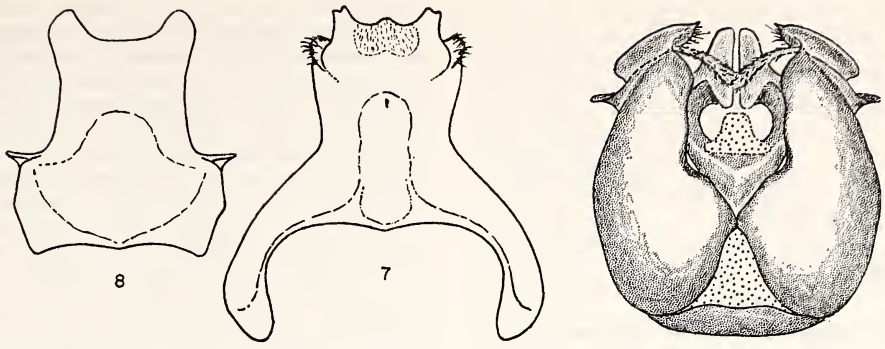


Figure 93—Genital armature and sterna 7 and 8 in male of *Anthophora walshii*.

and mid tibiae with some short, appressed, pale pubescence on outer face apically, the femora fringed posteriorly with pale hairs, hind tibial scopa pale yellow; basal abdominal tergum densely pale ochraceous pubescent, discs of the following terga with very short, suberect, scattered black hairs evident only under high magnification, these becoming more elongate, erect and conspicuous on the more apical terga, and tergum 5 with some pale hairs along lateral margins.

MALE—Length 16 mm., breadth of abdomen 6 mm.; black, apical half of clypeus and entire labrum yellow, upper half of clypeus with a median yellow line; mandibles broadly yellow at base; margin of supraclypeal area adjacent to clypeus narrowly yellow, and broad, lateral, yellow maculations filling area between clypeus and eye margin, extending narrowly up margin of eye to level of antennae; antennal scape yellow anteriorly; legs and spurs brownish-piceous, tegulae brownish-testaceous; wings subhyaline, veins brownish to piceous; apical rim of basal abdominal tergum, and the rather narrow, apical impressed areas of terga 2-6 ivory, in marked contrast to the otherwise black surface; cheeks somewhat narrower than eyes; clypeus rather strongly protuberant, its median length slightly greater than half the distance between eyes below; eyes subparallel; mandible with an inner, subapical tooth; basal segment of flagellum slightly shorter than segments 2 and 3 combined; hind basitarsi relatively straight and unmodified; lateral punctures on upper part of face minute and very close, the more median area below ocelli dull, very finely and obscurely punctate, maculated areas below very finely, quite sparsely and obscurely punctate, clypeus quite smooth, punctures hardly evident; punctures of labrum somewhat more distinct but scattered and irregular, becoming sparse laterally; apical margin of labrum with a pair of small, median denticles; cheeks quite smooth beneath pubescence, very minutely, obscurely and rather closely punctate; surface of scutum, scutellum and pleura smooth but dull, without evident punctures; propodeum somewhat more shining, posterior face with exceedingly minute, scattered and rather sparse punctures barely evident, lateral faces impunctate; basal abdominal tergum obscured by dense pubescence, punctures inevident; terga 2-6 smooth but dull, punctures exceedingly minute and barely visible, well separated but not sparse; head, thorax, legs and basal abdominal tergum entirely pale ochraceous pubescent, becoming somewhat more whitish on cheeks below and on legs and venter of thorax; discs of abdominal terga 2-5 with very fine, short, erect, dark pubescence, this becoming pale laterally and more elongate on the more apical terga; tergum 7 rather narrowly produced medially, this area slightly incurved; sterna 7 and 8 and genital armature as shown (fig. 93).

DISTRIBUTION—Kansas and Nebraska, east to the New England states, in August.

FLOWER RECORDS — *Baptisia* and *Chamaecrista*. This is recorded by Robertson (1929) on *Abutilon, Blephilia, Cassia, Cirsium, Helianthus, Lepedeza, Lobelia, Petalostemum, Ruellia* and *Teucrium*.

Emphoropsis Ashmead

(Fig. 67)

Emphoropsis Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 60. Type: *(Habropoda floridana* Smith) = *Bombus laboriosus* Fabricius. Desig. by Cockerell and Cockerell, 1901.

Meliturgopsis Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 62. Type: *(Emphoropsis murihirta* Cockerell) = *Emphoropsis murina* Cockerell. First included species, Cockerell, 1909.

Emphoropsis Cockerell, 1905. South. Calif. Acad. Sci. Bul. 4, pp. 99-100. Revision.

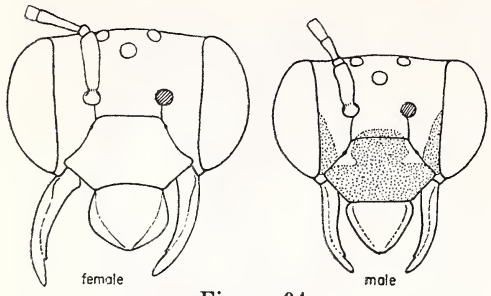


Figure 94
Facial view of head in both sexes of *Emphoropsis laboriosa.*

This genus bears a resemblance to *Anthophora* and can easily be mistaken for it. It differs in having a more elongate marginal cell in the front wing, and the 3rd submarginal is distinctly longer than the 2nd. The clypeus is black in the female, yellow in the male. The scopal hairs on the hind tibiae and basitarsi of the female are plumose. Only one species is found in the Eastern United States, but the genus is well represented in the West.

Emphoropsis laboriosa (Fabricius)

(Figs. 94 & 95)

Bombus laboriosus Fabricius, 1804. Systema Piezatorum, p. 352.

Anthophora floridana Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 339. ♀ ♂. New synonymy.

Emphoropsis floridana Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 15.5-16 mm., breadth of abdomen 6.5-7 mm.; entirely black; wings lightly but uniformly infuscated, veins piceous to black; cheeks subequal to eyes in width; clypeus quite strongly protuberant, its median length somewhat greater than half the distance between eyes below (fig. 94); eyes very slightly convergent below; median length of labrum about two-thirds the breadth, apical margin rather broadly rounded; mandibles with a small, inner, subapical tooth; basal segment of flagellum equalling segments 2 and 3 combined in length; hind basitibial plate short and broadly rounded, tibia with an elongate, apically narrowed, densely pale tomentose area immediately beyond the plate; clypeus somewhat shining, punctures quite deep, and rather coarse, irregularly scattered and rather sparse; labrum somewhat shining, more sparsely and finely punctate; supraclypeal area narrowly shining and impunctate along mid-line, becoming very closely and finely punctate on each side, lateral surfaces of face below level of antennae closely and finely but quite distinctly punctate, becoming much more minutely and closely punctate above antennae; surface shining between eyes and ocelli, punctures minute and vague; cheeks with fine and close punctures below, these becoming more sparse and indistinct above; scutum with a median posterior area with well separated but hardly sparse, shallow punctures, scutum, scutellum and pleura otherwise very minutely and closely punctate; posterior face of propodeum somewhat more shining, punctures exceedingly minute and indistinct, lateral surfaces dull, minutely and closely punctate; abdominal terga somewhat shining, punctures minute and rather close but distinct on the more basal terga, becoming somewhat closer along lateral margins and closer on the more apical terga; pygidium elongate triangular, apex rather narrowly rounded, margins carinate; scutum, scutellum and posterior face of propodeum entirely and densely pale ochraceous pubescent, pleura with a limited area of ochraceous pubescence above, otherwise black on head, thorax and legs; basal abdominal tergum with intermixed black and light pubescence which is quite long and copious, the following terga with very short, inconspicuous, suberect black pubescence, that on the more apical terga more elongate; tergum 5 with a quite dense, black or fuscous, apical fimbria.

MALE—Length 13-14 mm., breadth of abdomen 6-6.5 mm.; black, clypeus largely yellow, with only a small amount of black on each side above, the narrow adjacent margin of supraclypeal area and rather small lateral maculations, ending narrowly on eye margin at level of antennae, yellow (fig. 94); spurs brownish-testaceous; wings subhyaline basally, becoming very lightly infuscated apically, veins piceous to black; cheeks slightly narrower than eyes; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; labrum broadly rounded, its median length somewhat less than basal width; mandibles with a very small, inner, subapical tooth; basal segment of flagellum about equal to segment 2 in length; punctures of clypeus quite deep and distinct but rather fine and well separated, somewhat obscure on the yellow surface, those on labrum rather close and fine medially at base, becoming sparse on the shining surface on each side, the inflexed lateral margins quite closely and finely punctate; supraclypeal area very finely and closely punctate above the maculated margin, lateral areas of face below level of antennae somewhat shining, punctures fine and

distinct, slightly separated, surface above becoming very minutely and closely punctate; cheeks with very fine and close punctures below, becoming minute and indistinct above; median posterior area of scutum rather dull but smooth, with distinctly separated, scattered punctures, the scutum, scutellum and pleura otherwise very minutely and closely punctate throughout; posterior face of propodeum somewhat more shining, punctures minute and obscure, dorsal area largely impunctate medially; abdominal terga somewhat shining, punctures very fine and quite close, becoming much closer along lateral margins, and quite close on disc of tergum 6; pygidial area somewhat indefinite, the margins obscure, median length about equal to basal width, apex rather narrowly truncate; pubescence of scutum, scutellum, basal abdominal tergum and posterior face of propodeum long and copious, entirely pale ochraceous, pleura with some similar pubescence above beneath wing bases; vertex with some intermixed pale hairs below ocelli and across vertex, pubescence otherwise black on face, cheeks, pleura below, lateral surfaces of propodeum, legs entirely, and abdominal terga 2-7, very short and suberect on abdomen, hairs becoming somewhat more elongate on the more apical terga, especially at sides; sterna 7 and 8 and genital armature as shown (fig. 95).

DISTRIBUTION — Illinois to the New England states, south to Mississippi and Florida, November, January and February in Florida, elsewhere March to May.

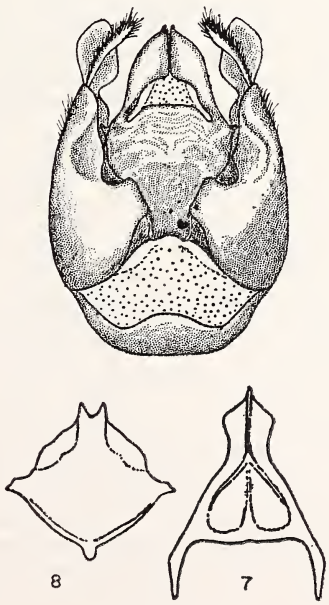


Figure 95
Genital armature and sterna 7 and 8 in male of *Emphoropsis laboriosa*.

FLOWER RECORDS — *Cirsium, Lupinus, Malus, Melilotus, Prunus, Vaccinium* and *Vicia*. Recorded by Robertson (1929) on *Cercis* and *Dicentra*.

The type of *Bombus laboriosus* Fabricius has been studied by H. E. Milliron at the Universitetets Zoologiske Museum in Copenhagen and found to be an anthophorid bee rather than a *Bombus* or *Psithyrus*. His description of the specimen leaves no doubt that it is conspecific with *Emphoropsis floridana* (Smith).

Centris Fabricius

(Fig. 67)

Centris Fabricius, 1804. Syst. Piez., p. 354. n. 68. Type: *Apis haemorrhoidalis* Fabricius. Desig. by Cockerell, 1906.

Hemisia Klug, 1807. Mag. Insektenk. 6, p. 227. Type: *Apis haemorrhoidalis* Fabricius. Desig. by Cockerell, 1906.

Trachina Klug, 1807. Mag. Insektenk. 6, p. 226. Type: *Centris longimana* Fabricius. Desig. by Cockerell, 1906.

Ptilotopus Klug, 1810. Mag. Gesell. Naturf. Freunde Berlin 4, p. 31. Type: *Ptilotopus americanorum* Klug. Monob.

Gundlachia Cresson, 1865. Ent. Soc. Phila. Proc. 4, p. 195. Preocc. Type: *(Centris ? cornuta* Cresson) = *Centris difformis* Smith.

Heterocentris Cockerell, 1899. Entomologist 32, p. 14. (new name) Type: *(Centris ? cornuta* Cresson) = *Centris difformis* Smith. Autob.

Centris subg. *Cyanocentris* Friese, 1900. K. K. Naturhist. Hofmus. Ann. 15, p. 244. Type: *Apis versicolor* Fabricius. Desig. by Sandhouse, 1943.

Centris subg. *Poecilocentris* Friese, 1900. K. K. Naturhist. Hofmus. Ann. 15, p. 244. Type: *Centris fasciatella* Friese. Desig. by Sandhouse, 1943.

Centris (Penthemisia) Moure, 1950. Dusenia 1, p. 390. Type: *Hemisia chilensis* Spinola. Orig. desig.

Hemisia Michener, 1951. Kans. Ent. Soc. Jour. 24, pp. 1-11. Subgenera.

Centris Michener, 1957. Bul. Zool. Nomencl. 13, pp. 287-291. Proposal to validate name.

This is primarily a tropical group, represented in the Eastern U. S. by only 2 species. They are rather robust, the males with a yellow clypeus and that in female either black or with yellow maculations.

The stigma is very small, the marginal cell short, reaching only slightly beyond the 3rd submarginal cell. The 2nd submarginal exceeds both the 1st and the 3rd in length. The scape is short, usually exceeded in length by the much elongated basal segment of the flagellum. In the female the scopa is well developed on the hind tibiae and basitarsi, the hairs plumose, and very long, dense and copious.

The proposal by Michener (1957) to validate the name *Centris* has been made to conserve that name in its present usage. Were this not done, the name *Hemisia* would replace it, and the name *Centris* would replace *Eulema*, a tropical genus related to *Bombus* and *Apis*.

KEY TO SPECIES

1. Females 2
   Males 3
2. Clypeus entirely black; abdomen black, without metallic reflections .... *lanosa* Cresson (below)
   Clypeus yellow apically and along midline above; abdomen largely ferruginous, with tergum 1 and median areas of 2-4 metallic green .... *versicolor* (Fabricius) (p. 335)
3. Clypeus entirely yellow; legs, except the more apical tarsal segments, piceous; abdominal terga beyond the base largely black ..... *lanosa* Cresson
   Clypeus with narrow yellow lines along the lateral margins; abdomen ferruginous in large part .... *versicolor* (Fabricius) (p. 335)

Centris lanosa lanosa Cresson

(Figs. 96 & 97)

Centris lanosa Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 284. ♂.

Centris Cockerellii Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51, p. 68. ♀.

Centris lanosa Cockerell, 1904. South. Calif. Acad. Sci. Bul. 3, p. 160. ♀.

FEMALE—Length 11 mm., breadth of abdomen 5 mm.; largely black, mandibles with a limited testaceous area apically, legs somewhat more piceous beneath, the mid and hind spurs brownish-testaceous, tegulae yellow; wings whitish-hyaline, veins piceous to black; cheeks slightly narrower than eyes; clypeus very slightly protuberant, its median length somewhat greater than half the distance between eyes; eyes subparallel (fig. 96); median length of labrum somewhat more than

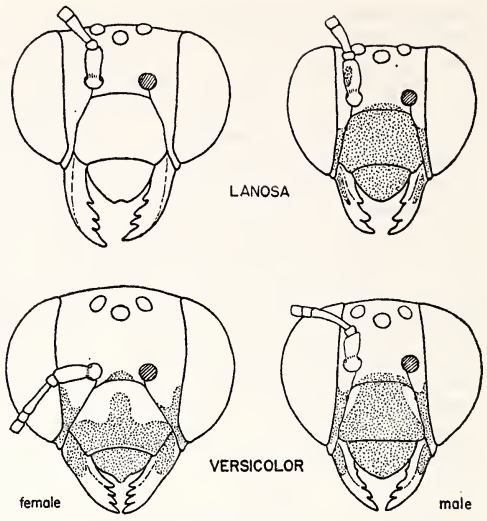


Figure 96
Facial views of head in species of *Centris*.

half the basal width, apical margin rather evenly rounded; mandibles distinctly quadridentate; basal segment of flagellum equal to segments 2-4 combined; front basitarsi only slightly longer than the maximum width; mid basitarsi quite broad and flat, width slightly more than half the length; clypeus shining, punctures deep and distinct, slightly separated, median line impunctate; punctures of labrum fine and very close throughout, becoming somewhat coarser apically; face very finely and quite closely punctate, becoming sparsely so between eyes and lateral ocelli where surface is polished, vertex with minute, rather close punctures; cheeks shining beneath the pubscence, with very minute and rather close punctures barely evident; surface of scutum and scutellum shining beneath dense pubescence, punctures minute and only slightly separated but quite uniform; pleura somewhat more deeply but still very finely punctate, the punctures well separated but hardly sparse; propodeum shining posteriorly, punctures minute and obscure, lateral faces shining, punctures minute but quite close; abdominal terga 1 and 2 with minute, quite close, evenly distributed punctures throughout; punctures of terga 3-5 becoming more distinct, deep and somewhat more widely separated, but still quite close; pygidium narrow and elongate, narrowly rounded at apex; pubescence of head rather copious but not very long, quite dense and whitish on cheeks, becoming more yellowish on face around antennae and across vertex where it is quite dense and elongate; dorsum of thorax, propodeum and upper portion of pleura densely, short, ochraceous pubescent, largely hiding surface; pleura lateral-

ly and below, and legs, fuscous to blackish pubescent, the hind tibial scopa black; basal abdominal tergum with some rather short, pale pubescence anteriorly, terga otherwise entirely covered with very short, suberect, entirely black pubescence, the hairs becoming more elongate on the more apical terga.

MALE—Length 11 mm., breadth of abdomen 5 mm.; black, the clypeus, labrum, mandibles at base, antennal scape anteriorly, lower margin of supraclypeal area and very small lateral facial maculae, yellow (fig. 96); legs somewhat more brownish-piceous, apical tarsal segments becoming brownish-testaceous, spurs brownish-piceous, tegulae yellow; wings whitish-hyaline, veins testaceous to piceous; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length considerably more than half the distance between eyes; eyes subparallel; labrum broadly rounded, its median length slightly more than half the basal width; mandibles distinctly tridentate apically; basal segment of flagellum somewhat longer than segments 2 and 3 combined, the 2nd somewhat broader than long; front and mid basitarsi quite slender and elongate, the middle pair with a long, dense, posterior fringe; hind basitarsi quite broad and flat, apex abruptly narrowed, prominantly fringed over entire length; punctures of clypeus quite deep and distinct, rather fine, only slightly separated, the mid-line narrowly impunctate; punctures of labrum fine and quite close throughout, especially around margin; face above antennae finely and closely punctate, becoming shining and nearly impunctate below anterior ocellus and between lateral ocelli and eyes; vertex quite closely and deeply punctate; cheeks shining beneath the rather dense pubescence, with fine and rather close punctures; scutum and scutellum shining beneath dense pubescence, punctures fine, rather sparse on scutum posteriorly, becoming somewhat closer but still fine anteriorly and laterally, rather coarse and slightly separated over most of scutellum, deep, rather coarse and well separated on pleura above, becoming slightly finer and closer below; propodeum shining, punctures minute and quite sparse; punctures of abdominal terga 1 and 2 uniform, very fine and quite close, those on 3-5 somewhat more distinct and more widely separated, becoming more minute and close toward apical margins; pubescence of head largely pale, with a few, obscure, dark hairs around ocelli, nearly white on cheeks below, more ochraceous on vertex; scutum, scutellum, propodeum and basal abdominal tergum entirely pale ochraceous pubescent, pleura above more whitish pubescent becoming abruptly black beneath; pubescence of front legs largely pale, but femora with a few dark hairs intermixed with the generally light posterior fringe; mid tibiae with a considerable amount of pale ochraceous pubescence in the posterior fringe, this intermixed with long fuscous hairs, and mid tarsi entirely fuscous, the posterior basitarsal fringe of very long hairs that are fuscous and quite densely plumose; hind legs largely dark pubescent, tibiae with a small amount of short, yellowish pubescence at base, conspicuously fringed toward apex, with elongate, fuscous, plumose hairs and basitarsus with a similar dense fringe; abdominal terga 2-6 entirely blackish pubescent, very short, subappressed on the more basal terga, becoming more elongate and erect on the more apical terga; sterna 7 and 8 and genital armature as shown (fig. 97).

DISTRIBUTION—Oklahoma and Texas, to Florida, June.

Another subspecies of *lanosa* occurs in the Southwest, making necessary the subspecific designation of this typical form.

Centris versicolor (Fabricius)

(Figs. 96 & 97)

Apis versicolor Fabricius, 1775. Syst. Ent. p. 386.

?Centris ardens Smith, 1874. Ann. Mag. Nat. Hist. (4) 13, p. 367. ♀.

Centris errans Fox, 1899. Acad. Nat. Sci. Phila. Proc. 51, p. 65. ♀.

Centris versicolor Moure, 1945. Rev. de Ent. 16, p. 404. (synonymy)

FEMALE—Length 13-14 mm., breadth of abdomen 5.5-6 mm.; head and thorax largely black; apical half of clypeus yellow, the maculation produced medially nearly to the dorsal margin; labrum entirely yellow, basal half of mandibles yellow and triangular yellow maculae at sides of face ending narrowly on eye margin about at level of antennae (fig. 96); antennal scape narrowly yellow anteriorly, the flagella piceous below, blackish above; legs bright ferruginous, spurs dull testaceous; tegulae yellowish; wings subhyaline, veins piceous to black; basal abdominal tergum metallic blue-green, becoming narrowly ferruginous along the rim, the following terga largely ferruginous, but terga 2-4 to some degree metallic greenish medially; cheeks slightly narrower than eyes; clypeus slightly protuberant, its median length considerably greater than half the distance between eyes; eyes subparallel; mandibles rather short, quadridentate apically; labrum subtriangular, its median length about half the basal width, apex subacute; basal segment of flagellum slightly longer than segments 2-4 combined; clypeus shining, punc-

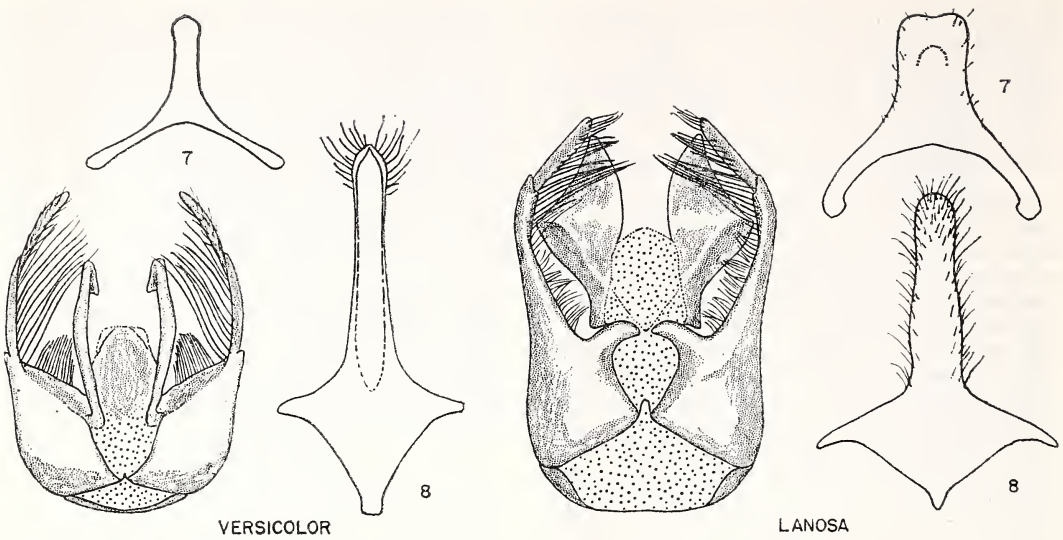


Figure 97—Genital armature and sterna 7 and 8 in males of *Centris*.

tures fine, rather sparse, those on labrum fine but somewhat closer apically, face above antennae finely and densely punctate, surface between eyes and ocelli shining, punctures becoming more minute and sparse, but vertex finely and closely punctate; cheeks with minute, densely crowded punctures; scutum, scutellum and pleura finely and closely punctate, becoming somewhat more coarsely so on pleura below; propodeum shining posteriorly, punctures minute and rather vague, lateral faces shining, punctures somewhat more distinct but very fine and well separated; front basitarsi slender and very short, with a posterior fringe of much elongated hairs, and with two or three robust, apically dilated setae; mid basitarsi broad and flat, gradually narrowed apically; the more basal abdominal terga very minutely and closely punctate throughout, punctures becoming somewhat more distinct and more widely separated but still very fine on terga 4 and 5; pygidium quite small, narrowly triangular, apex narrowly rounded; pubescence largely yellowish-white on cheeks and face, vertex with intermixed, erect, fuscous hairs and a few shorter fuscous hairs below ocelli; thorax entirely covered with dense, short, entirely pale pubescence, yellowish-white laterally, becoming ochraceous on dorsum; pubescence on legs entirely yellowish-white to fulvous, the scopa on tibiae and basitarsi yellowish, of elongate, quite densely plumose hairs, the basitarsi beneath with brownish-fuscous hairs; basal abdominal tergum with some thin, rather short but erect, yellowish-white pubescence; terga 2 and 3 with extremely short, subappressed, barely visible pubescence, 4 and 5 with more elongate and erect yellowish pubescence.

MALE—Length 11-13 mm., breadth of abdomen 5-5.5 mm.; head and thorax chiefly black; clypeus largely yellow, with a narrow band of black on each side; labrum entirely yellow, and mandibles yellow except at apex and along the margins; antennal scape broadly yellow anteriorly; the supraclypeal area narrowly yellow along clypeal margin; lateral facial maculae yellow, ending acutely on eye margin about at level of upper margin of clypeus (fig. 96); legs largely ferruginous, mid and hind coxae, trochanters and base of femora to some degree blackish, spurs pale ferruginous, tegulae bright yellow; wings subhyaline, veins piceous to black; basal abdominal tergum largely blackish basally, the disc rather broadly yellowish-hyaline apically, following terga largely ferruginous, more or less infused with metallic greenish medially, apical margins rather broadly pale yellowish-hyaline; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length much greater than half the distance between eyes; eyes subparallel; mandibles distinctly tridentate apically; labrum subtriangular, median length slightly more than half the basal width, apex rather narrowly rounded; basal segment of flagellum about equal to segments 2-4 combined; front and mid basitarsi quite slender and elongate, hind basitarsi broad and flat, abruptly narrowed at apex; punctures of maculated areas of face minute and sparse, surface above antennae closely and finely punctate, punctures becoming quite

sparse between lateral ocelli and eyes, but vertex closely and quite deeply punctate; cheeks dull, with very fine, close punctures; punctures of scutum, scutellum and pleura rather coarse and quite close, somewhat separated in center of scutum posteriorly where surface is shining; posterior face of propodeum shining, punctures very minute, sparse and obscure, lateral faces shining, more closely punctate posteriorly; punctures of basal abdominal tergum fine, quite distinct, well separated, becoming finer and closer at each extreme side, more minute on the apical yellowish area; terga 2 and 3 with very fine, quite close, uniformly distributed punctures throughout, those on 4-6 somewhat coarser, deeper and more widely separated, but not sparse; pubescence copious but rather short, entirely pale on head, thorax, legs and basal abdominal tergum, whitish on cheeks below and on basal tergum, more yellowish on face, pleura and propodeum, bright ochraceous on vertex medially and on dorsum of thorax; front and middle tibiae and basitarsi fringed posteriorly with elongate, yellowish, plumose hairs, hind tibiae with elongate hairs toward the apex, but these very short basally, the basitarsi with a pronounced, elongate, posterior fringe; discs of abdominal terga rather uniformly, densely covered with thin, pale, erect, more or less yellowish pubescence which does not hide the surface, becoming more elongate on the

Table 10—Distribution of species of *Xenoglossodes, Tetralonia, Anthophora, Emphoropsis* and *Centris* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Xenoglossodes	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
albata									X																		
Tetralonia																											
atriventris							X		X			X			X	X			X	X		X				X	
belfragei								X		X																	
dubitata										X					X							X				X	
frater							X		X																		
fulvohirta																						X				X	
hamata										X												X				X	
illinoensis									X																		
rosae									X	X	X	X							X		X	X				X	X
Anthophora																											
abrupta								X	X	X	X		X	X	X				X	X	X	X				X	X
bomboides	X	X						X					X		X			X			X	X				X	
furcata (western)																											
f. teminalis	X		X	X		X	X	X	X	X	X		X		X			X				X					
raui								X			X		X														
ursina					X								X						X			X				X	
walshii				X					X	X	X																
Emphoropsis																											
laboriosa											X			X					X			X		X		X	X
Centris																											
lanosa																											X
versicolor																											X

more apical terga; terga 5 and 6 with elongate, curled hairs laterally; sterna 7 and 8 and genital armature as shown (fig. 97).

DISTRIBUTION — Florida, March and April.

FLOWER RECORDS — *Borrichia, Byrsonima, Carymbola, Eugenia, Ocimum, Securidaca* and *Thryallis.*

Nomada Scopoli

(Fig. 67)

Nomada Scopoli, 1770. Historico Naturalis Ann. 4, p. 44. Type: *Nomada ruficornis* (Linnaeus). Desig. by Curtis, 1832.

Nomada Cresson, 1887. Amer. Ent. Soc. Trans. Sup. (2), pp. 296-297. (revision)

Nomada subg. *Heminomada* Cockerell and Atkins, 1902. Ann. Mag. Nat. Hist. (7) 10, p. 42. Type: *Nomada obliterata* Cresson. Monob. and orig. desig.

Nomada subg. *Micronomada* Cockerell and Atkins, 1902. Ann. Mag. Nat. Hist. (7) 10, p. 44. Type: *Nomada modesta* Cresson. Monob. and orig. desig.

Gnathias Robertson, 1903. Canad. Ent. 35, p. 173. Type: *Nomada bella* Cresson. Orig. desig.

Phor Robertson, 1903. Canad. Ent. 35, pp. 173 & 177. Type: *(Nomada integra* Robertson) = *Nomada integerrima* Dalla Torre. Monob. and orig. desig.

Xanthidium Robertson, 1903. (not Ehrenberg). Canad. Ent. 35, pp. 174 & 177. Type: *Nomada luteola* Olivier. Orig. desig.

Holonomada Robertson, 1903. Canad. Ent. 35, pp. 174 & 177. Type: *Nomada superba* Cresson. Orig. desig.

Cephen Robertson, 1903. Canad. Ent. 35, pp. 174 & 176. Type: *Nomada texana* Cresson. Monob. and orig. desig.

Centrias Robertson, 1903. Canad. Ent. 35, pp. 174 & 176. Type: *Nomada erigeronis* Robertson. Orig. desig.

Nomada subg. *Nomadula* Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 611. Type: *(Nomada americana* ? Kirby) = *Nomada articulata* Smith. Orig. desig.

Nomada Cockerell, 1904. Colo. Exp. Sta. Rpt. of Ent. Bul. 94, pp. 65-85.

Nomada Cockerell, 1905. Amer. Ent. Soc. Trans. 31, pp. 309-312. (Smith types)

Nomada Cockerell, 1911. U. S. Natl. Mus. Proc. 41, pp. 225-243.

Nomada Swenk, 1912. Univ. Nebr. Stud. 12, pp. 1-113.

Nomada Rodeck, 1931. Amer. Mus. Novitates 496, pp. 1-11.

Nomada subg. *Pachynomada* Rodeck, 1945. Ent. News 56, p. 180. Type: *Nomada (Holonomada) vincta* Say. Orig. desig.

Nomada subg. *Callinomada* Rodeck, 1945. Ent. News 56, p. 181. Type: *Nomada (Holonomada) antonita* Cockerell. Orig. desig.

Nomada subg. *Laminomada* Rodeck, 1947. Ent. Soc. Amer. Ann. 40, p. 266. Type: *Nomada (Holonomada) hesperia* Cockerell. Orig. desig.

Nomada subg. *Callinomada* Rodeck, 1949. Ent. Soc. Amer. Ann. 42, pp. 174-186. (revision)

This is a very large genus of wasp-like, parasitic bees, usually red or black in color, with yellow or red integumental maculations. They are parasitic chiefly on *Andrena.* In the front wing the stigma is well developed, the marginal cell is elongate, acute at tip and not divergent from the costal margin, and usually there are three submarginal cells. The 1st submarginal cell equals the 2nd and 3rd combined in length. The pubescence is usually very short, thin and inconspicuous. The maxillary palpi are 6-segmented. The abdomen differs from that in most other genera in the form of the basal tergum, the lateral margins of which are produced as free flaps that overlie the margins of the sternum. In the female, sternum 6 is broadened and exposed apically, and conspicuously spinose on each latero-apical angle. The pygidium is well developed in both sexes, but is usually hidden by tergum 5 in the female, this plate having a more or less conspicuous pseudopygidial area apically.

Ten subgenera of *Nomada* have been recognized in the Nearctic region. Some of these (*Gnathias, Holonomada, Pachynomada, Callinomada, Micronomada* and *Nomadula*) are quite distinct and easy to recognize, once the characters are comprehended and observed. The subgenus *Centrias* is represented by a single species which shows marked similarities to the species of *Nomadula,* and its recognition as a distinct group seems questionable. *Heminomada* is a rather large group of species having complete yellow abdominal bands in both sexes, but the line of demarkation separating it from the subgenus *Nomada* is obscure. Furthermore, if a species is known in but one sex, it may be difficult to place it with confidence in one or the other of these groups. *Phor* is a very small

group, closely related to *Nomada* and its status seems to this writer to be questionable.

Of the 87 species which are keyed out and described in the following pages, 40 are either assigned to the subgenus *Nomada* or cannot be placed with certainty in any of the other subgenera. For this reason, a number of them are not placed in any subgeneric group. Their future inclusion in any of these depends upon a more intensive and comprehensive study of the genus, and upon more collecting at the nesting sites of the hosts, with a consequent basis for correlation of the sexes and the degree of variation within the species. This variation is very marked in certain of the subgenera, notably in *Gnathias*, where specific limits are very difficult to determine. No character, or combination of characters, seems entirely reliable, and the degree of sexual dimorphism makes correlation of the sexes difficult.

Because of these difficulties, no new species are proposed in the subgenus *Gnathias*. The types of those species or forms which occur in the Eastern United States have been studied and some opinions regarding synonymy have been formed. Those species which seem valid have been included in the comprehensive key to species of the genus, and specimens which agree reasonably well with these type specimens should be identifiable. Others, however, which are less typical in character, will need to be indicated as of doubtful identity.

Summary of key to females of *Nomada*

A—Mandibles bidentate—couplet 2

B—Front coxae spinose—couplet 8 (p. 340)

C—Short side of segment 1 of flagellum equal to segment 2—couplet 18 (p. 340)

D—Abdominal terga with complete yellow bands—couplet 26 (p. 341)

E—Head and thorax yellow maculated—couplet 36 (p. 341)

F—Pseudopygidium extensive—couplet 44 (p. 342)

G—Abdominal terga black, with yellow maculations—couplet 47 (p. 342)

H—Face with erect fuscous hairs—couplet 49 (p. 342)

I—With but two submarginal cells ..... *decepta*

J—Abdominal terga red, without maculae —couplet 53 (p. 342)

K—Long side of segment 1 of flagellum equal to segment 2—couplet 56 (p. 342)

L—Basal flagellar segment much shorter than segment 2—couplet 60 (p. 343)

Summary of key to males of *Nomada*

A—Mandibles bidentate—couplet 2 (p. 343)

B—Segment 3 of flagellum spinose beneath—couplet 8 (p. 343)

C—Segment 1 of flagellum fully equal to segment 2—couplet 13 (p. 343)

D—Pygidium entire—couplet 25 (p. 344)

E—With but two submarginal cells—couplet 28 (p. 344)

F—Abdominal terga with broad, complete bands—couplet 30 (p. 344)

G—Segments 2-7 of flagellum excavated beneath—couplet 41 (p. 345)

H—Basal vein interstitial with transverse median—couplet 44 (p. 345)

I—Clypeus black, at least in part—couplet 47 (p. 345)

J—Terga 2 and 3 with transverse bands—couplet 49 (p. 345)

K—Scutum red or ferruginous—couplet 55 (p. 346)

L—Scutum entirely black—couplet 59 (p. 346)

KEY TO SPECIES

Females

1. Mandibles bidentate, having a distinct, subapical, inner tooth *(Gnathias)* .. 2
   Mandibles simple 8

2. Head and thorax with much black; propodeum almost entirely so ..... *perplexa* Cresson (p. 352)
   Head and thorax red in large part, black areas more restricted, and propodeum usually with much red 3

3. Usually larger (11 mm.); 2nd submarginal cell nearly as broad anteriorly as it is long, nearly square, 3rd narrowed nearly to a point 4
   Smaller (8 mm. or less); 2nd and 3rd submarginal cells usually more nearly equal anteriorly 5

4. Abdominal terga 2-5 conspicuously yellow maculated; metapleura usually red and head almost entirely red ..... *maculata* Cresson (p. 350)

Only 2nd and 3rd abdominal terga maculated; metapleura and anterior portion of propodeum black; face with a blackened area between antennae ..... *cuneata* Robertson (p. 347)

5(3). Smaller (5-6 mm.); head and thorax, including metapleura, light ferruginous ..... *louisianae* Cockerell (p. 349)
Somewhat larger (7 mm. or more); head and thorax usually dark red, the metapleura black 6

6. Tegulae minutely and rather sparsely punctate; abdominal terga quite smooth, with only exceedingly minute, vague and obscure punctures ..... *subnigrocincta* Swenk (p. 353)
Tegulae deeply, distinctly and quite closely punctate; and basal half of tergum 2 with fine, but distinct and close punctures 7

7. Segment 1 of flagellum, measured on the longer side, equal to segment 2; abdominal terga dark red, with contrasting yellow maculations ..... *lepida* Cresson (p. 347)
Segment 1 of flagellum considerably shorter than segment 2, even on upper side; light red, the yellow maculations not so strongly contrasting, and face often yellowish between clypeus and eyes .. .. *ovata* Robertson (p. 351)

8(1). Front coxae with distinct, acute spines, often obscured by the pubescence 9
Front coxae without spines or with very short obscure spines or denticles .. 18

9. Segment 2 of flagellum slightly shorter than basal segment, not much longer than broad *(Micronomada)* 10
Segment 2 of flagellum much longer than broad, usually distinctly longer than basal segment *(Nomadula* and *Centrias)* 14

10. Propodeum with conspicuous yellow maculae ..... *modesta* Cresson (p. 356)
Propodeum entirely black 11

11. Abdominal terga 3-5 largely black, with only narrow, interrupted, yellow or reddish bands or lateral spots ..... *fervida* Smith (p. 354)
Abdominal terga 3-5 with bright yellow, transverse bands, that on 3 interrupted or much narrowed medially 12

12. Transverse yellow band on tergum 2 strongly constricted medially, not much wider than that on tergum 3, which is uninterrupted *texana* Cresson (p. 358)
Transverse band on tergum 2 not so strongly constricted, much wider than that on 3, the latter usually interrupted medially 13

13. Supraclypeal area densely and coarsely rugoso-punctate ..... *wisconsinensis* Graenicher (p. 359)
Supraclypeal area shining between deep, distinct punctures ..... *heiligbrodtii* Cresson (p. 355)

14(9). Basal segment of flagellum very short, length about equal to the apical width; abdominal terga 2-5 with small, inconspicuous, yellow maculae ..... *seneciophila* new species (p. 370)
Basal segment of flagellum much longer than the apical width 15

15. Scutum largely black; 2nd abdominal tergum black along posterior border, and with a narrow median black line connecting this band with a similar basal band, the resulting lateral areas red or yellow; vertex black; more robust.. ..... *erigeronis* Robertson (p. 364)
Smaller; scutum, vertex and 2nd tergum of abdomen almost entirely red 16

16. Terga 3-5 with ivory bands or maculae ..... *rubicunda* Olivier (p. 368)
Abdomen entirely red, without pale maculae 17

17. Hind tibiae with a row of five elongate black setae at apex ..... *australis* new species (p. 367)
Hind tibiae without these elongate apical setae, or if at all evident, then very short ..... *articulata* Smith (p. 365)

18(8). Basal segment of flagellum, measured along the shorter side, at least equal to segment 2 19
Length of segment 2 somewhat greater than the shorter side of basal segment 26

19. Scutum largely or entirely red *(Phor)*.. ..... *integerrima* Dalla Torre (p. 377)
Scutum largely black, possibly with yellow or reddish stripes 20

20. Propodeum conspicuously swollen or tuberculate on each side, posterior to the spiracles *(Holonomada)* 21
Propodeum not at all swollen or tuberculate 22

21. Scutum and propodeum entirely black.. ..... *superba* Cresson (p. 362)
Scutum margined with yellow on each side, and with a pair of narrow, more median, yellow lines; propodeum with large, yellow maculations ..... *affabilis* Cresson (p. 361)

22(20). Mandibles robust, subangulate me-

dially on outer margin, apical third abruptly narrowed to tip; scutum usually yellow-striped ..... *(Heminomada) annulata* Smith (p. 380)
Mandibles relatively slender, gradually narrowed to the tip; scutum entirely black 23

23. Scutum, propodeum, upper half of head, and basal abdominal tergum entirely black *(Callinomada)* 24
At least some of these areas with red or yellow maculations 25

24. Maculations ivory; clypeus largely or entirely black; lateral facial maculae very short .... *aquilarum* Cockerell (p. 372)
Maculations bright yellow; clypeus yellow, possibly with reddish infusions; lateral facial maculae nearly reaching top of eye ..... *placida* Cresson (p. 374)

25(23). Labrum and clypeus black in part .. *(Heminomada) graenicheri* Cockerell ..... (p. 391)
Labrum and clypeus entirely yellow .... *(Pachynomada) vincta* Robertson ..... (p. 379)

26(18). Abdominal terga with conspicuous, entire, bright yellow, transverse bands *(Heminomada)* 27
Abdominal bands, if present, interrupted medially at least on terga 2 and 3 .. 36

27. With but two submarginal cells ..... *obliterata* Cresson (p. 395)
With the usual three submarginal cells 28

28. Scutum black or red, narrowly bright yellow laterally, and usually with a pair of submedian, longitudinal yellow lines 29
Scutum without yellow lines 31

29. Dorsal surface of scutellum rather flat, smooth and shining between the coarse, deep and distinct punctures; flagellar segment 2 only very slightly longer than shorter side of segment 1 ..... *bishoppi* Cockerell (p. 383)
Scutellum more rounded, coarsely rugose or closely punctate; segment 2 of flagellum much longer than shorter side of segment 1 30

30. Head and thorax with much black, in addition to the yellow, with little or no red; segment 2 of flagellum fully twice the length of segment 1 on its shorter side ..... *sulphurata* Smith (p. 398)
Head and thorax with a considerable amount of red, in addition to the yellow, with but very little black; segment 2 of flagellum not twice the length of segment 1 on its shorter side ..... *luteola* Lepeletier (p. 393)

31(28). Scutum entirely black ..... *colorata* new species (p. 386)
Scutum red in general, possibly with a narrow, median, black line, but without yellow 32

32. Head yellow in large part, with a limited area of black above antennae, another surrounding ocelli, and over posterior area of cheeks ..... *dentariae* Robertson (p. 386)
Head largely red, often with limited areas of yellow or black, or lower half of face yellow, upper portion chiefly red 33

33. Scutellum entirely red, concolorous with scutum, the punctures coarse and confluent 34
Scutellum bright yellow dorsally, this area with coarse, well separated punctures 35

34. Basal segment of flagellum much longer than its apical width, the longer side equal in length to segment 2 ..... *xanthura* Cockerell (p. 400)
Basal segment of flagellum much shorter than segment 2, the shorter side no longer than its apical width ..... *pseudops* Cockerell (p. 397)

35(33). Face mostly yellow below level of antennae .. *capitalis* new species (p. 385)
Face more reddish below level of antennae ..... *imbricata* Smith (p. 392)

36(26). Head and thorax more or less conspicuously yellow maculated 37
Head and thorax largely black or red, without yellow maculations *(Nomada)* 44

37. Scutum chiefly red 38
Scutum black 40

38. Mandibles long and slender, tip of one nearly reaching base of other when closed; yellow maculations limited to tergum 2 ..... *(Heminomada) miniata* Smith (p. 394)
Mandibles of ordinary length; terga 2-5 conspicuously maculated 39

39. Scutum dark red, finely and closely punctate; scutellum yellow dorsally ..... *augustiana* new species (p. 402)
Scutum light red, coarsely and deeply punctate; scutellum entirely red, concolorous with scutum ..... *(Heminomada) pseudops* Cockerell (p. 397)

40(37). Tegulae unusually large, punctures deep and distinct, rather sparse; scutum with a small yellow maculation adjacent to each tubercle ..... *(Heminomada) electa* Cresson (p. 388)
Tegulae not unusually large 41

41. Basal segment of flagellum very short, less than half the length of segment 2, even when measured on the longer, upper side .... *(Heminomada) electella* Cockerell (p. 389)
Basal segment of flagellum more than half length of segment 2 42

42. Small (6.5 mm.); abdominal terga dark, without yellow bands, but the broad, apical, impressed areas yellowish-hyaline .*kingstonensis* new species (p. 420)
Larger (8 mm. or more); abdominal terga with conspicuous, bright yellow bands 43

43. Clypeus quite flat, very broad and short, largely yellow, with numerous erect, rather dark hairs; propodeum largely black, with only a pair of very small yellow spots on basal triangle .... *sphaerogaster* Cockerell (p. 432)
Clypeus strongly protuberant, yellow apically, black along basal margin, pubescence very short, entirely pale and barely visible; propodeum with a pair of large yellow blotches ..... *(Heminomada) festiva* Cresson (p. 390)

44(36). Pseudopygidial area unusually extensive, covering about half the surface of tergum 5 along mid-line 45
Pseudopygidial area of the usual narrow form 47

45. Punctures of scutellum, and of scutum posteriorly, well separated, pseudopygidial area relatively narrow, occupying no more than a third of the apical margin of tergum 5 .... *skinneri* Cockerell (p. 429)
Punctures of scutum and scutellum contiguous, if not crowded; pseudopygidial area usually much broader, lateral portions of apical margin of the tergum much shorter than breadth of the area 46

46. Scutum rather finely and quite densely punctate; tegulae closely punctate toward inner side; propodeum largely red ..... *depressa* Cresson (p. 413)
Scutum more coarsely punctate, the punctures not crowded; tegulae very minutely and sparsely punctate; lateral faces of propodeum largely black .... *media* new species (p. 421)

47(44). Abdominal terga piceous or black, ornamented with contrasting, bright yellow maculations 48
Abdominal terga chiefly red, more or less ornamented with yellow 49

48. Clypeus black, with only the apical rim narrowly red; inner orbits red .... *vicina* Cresson (p. 434)
Clypeus entirely reddish; lower inner orbits bright yellow .... *banksi* Cockerell (p. 404)

49(47). Face with long, erect or suberect, fuscous hairs; tegulae very sparsely and minutely punctate 50
Hairs on face and clypeus entirely pale, largely decumbent 52

50. Terga 4 and 5 conspicuously yellow maculated .... *inepta* new species (p. 419)
Terga 4 and 5 entirely red 51

51. Scutellum rounded, little if any impressed medially; abdominal terga entirely red, not maculated .... *valida* Smith (p. 434)
Scutellum quite deeply grooved medially; tergum 2 and sometimes 3, with conspicuous, lateral, yellow maculae .... *composita* new species (p. 408)

52(49). First transverse cubital vein absent, thus with only two submarginal cells .. .. *decepta* new species (p. 411)
With the usual three submarginals .. 53

53. Abdominal terga entirely red, without any evident yellow areas 54
At least tergum 2 with lateral, yellow maculations 56

54. Apical depressed areas of terga smooth and impunctate .... *lehighensis* Cockerell (p. 420)
Apical depressed areas of abdominal terga closely and distinctly punctate, with only the narrow rims impunctate .. 55

55. Scutellum deeply grooved medially .... *crudelis* Cresson (p. 410)
Scutellum evenly rounded posteriorly, not at all bilobed .... *nigrocincta* Smith (p. 424)

56(53). Segment 1 of flagellum as long as segment 2 when measured on the longer, upper side 57
Long side of segment 1 at least slightly shorter than segment 2 60

57. Front coxae with short, triangular spines ..... *denticulata* Robertson (p. 411)
Front coxae simple 58

58. Very small (5 mm.); abdominal terga nearly impunctate, with only very minute and obscure punctures visible laterally .... *parva* Robertson (p. 425)
Larger (7 mm. or more); abdominal terga distinctly, even though finely, punctate 59

59. Scutellum rounded, the median groove or impression very shallow or absent .... *lehighensis* Cockerell (p. 420)
Scutellum distinctly grooved or impressed medially, thus more or less bilobed .... *illinoensis* Robertson (p. 417)

60(56). Apical abdominal terga to some degree maculated .... *cressonii* Robertson (p. 409)
Yellow maculations limited to lateral areas of terga 2 and 3 61

61. Propodeum red, at least in part 62
Propodeum largely or entirely black, and pleura black in large part 64

62. Tegulae very finely and closely punctate; face with little or no black between antennae .... *tyrrellensis* new species (p. 433)
Tegulae more coarsely or sparsely punctate; face blackened between and above antennae 63

63. Larger (9 mm.); very dark red; tegulae more reddish, the punctures deep, distinct and close except over posterior third ..... *pygmaea* Cresson (p. 426)
Smaller (6 mm.); light red; tegulae more yellowish, the punctures minute .... *sayi* Robertson (p. 428)

64(61). Smaller (6 mm.); segment 1 of flagellum very short, not much longer than its apex is broad; terga 2 and 3 with large, lemon yellow spots; scutellum only slightly grooved .... *ceanothi* Cockerell (p. 406)
Larger (8 mm.); segment 1 of flagellum much longer than its apex is broad; tergum 3 without maculae, 2 with a pair of very small, lateral, yellow spots ... .. *florilega* Lovell & Cockerell (p. 415)

Males

1. Mandibles bidentate, having a distinct, subapical, inner tooth *(Gnathias)* ... 2
Mandibles simple 8

2. Scutellum rounded, the median groove barely evident or entirely absent; abdominal bands nearly complete; segment 1 of flagellum nearly as long as segment 2, measured on the longer side, much longer than broad 3
Scutellum with a distinct median groove, or segment 1 of flagellum not much longer than broad, and much shorter than segment 2 4

3. Scutellum and usually the scape also entirely black .... *bella* Cresson (p. 346)
Scape yellow anteriorly; scutellum red .. .. *maculata* Cresson (p. 350)

4(2). Scutum and mesopleura largely red . 5
Scutum and mesopleura largely or entirely black 6

5. Basal segment of flagellum very short, the shorter side no longer than apical width ... *hydrophylli* Swenk (p. 348)
Basal segment of flagellum much longer than its apical width, the longer side about equal in length to segment 2 .. .. *ovata* Robertson (p. 351)

6(4). Mid antennal segments slightly longer than wide (1:1.2) .... *perplexa* Cresson (p. 352)
Mid antennal segments as broad as long 7

7. Abdominal maculae limited to small, widely separated, yellow spots on terga 2 and 3 ..... *louisianae* Cockerell (p. 349)
Abdominal terga 2-5 with entire or slightly interrupted yellow bands .... *lepida* Cresson (p. 347)

8(1). Segment 3 of flagellum spinose beneath; pedicel nearly or quite hidden in the deeply concave apex of the scape *(Nomadula* and *Centrias)* 9
Segment 3 of flagellum not spinose; pedicel usually not so enclosed by the scape 13

9. Segments 2 and 3 of flagellum subequal in length, the length not much exceeding the breadth .... *seneciophila* new species (p. 370)
Segment 2 of flagellum considerably longer than 3, fully twice as long as it is broad 10

10. Hind femora simple, ventral surface rounded; scutellum bright yellow .... *rubicunda* Olivier (p. 368)
Hind femora arcuate, lower surface flattened or slightly concave, the margins subcarinate 11

11. Tegulae, tubercles, axillae, and an anterior blotch on mesopleura bright yellow .... *erigeronis* Robertson (p. 364)
Tegulae ferruginous, axillae black or reddish, pleura largely black 12

12. Scutum partly, and scutellum entirely, ferruginous; metanotum usually yellow in part ..... *articulata* Smith (p. 365)
Thorax entirely black except the tubercles and a pair of small inconspicuous yellowish maculae on collar; scutellum sometimes red, but metanotum black.. ..... *australis* new species (p. 367)

13(8). Basal segment of flagellum equal to segment 2, even if measured along its shorter side 14
Basal segment of flagellum considerably shorter than segment 2, at least if measured along its shorter side 25

14. Apex of pygidium deeply incised or emarginate 15
Apex of pygidium entire, rounded, or truncate 20

15. Abdominal sterna almost entirely bright yellow; front coxae simple (not spinose) ..... *(Heminomada) annulata* Smith (p. 380)
Abdominal sterna almost entirely black or piceous; front coxae with slender pubescent spines *(Micronomada)* .. 16

16. Propodeum conspicuously yellow maculated ..... *modesta* Cresson (p. 356)
Propodeum usually entirely black, sometimes reddened, but not maculated . 17

17. Scape ferruginous; transverse yellow bands on terga 3-5 very narrow; tergum 6 entirely black ..... *fervida* Smith (p. 354)
Scape yellow anteriorly; transverse bands on terga 3-5 broad laterally, narrowed medially; tergum 6 yellow maculated 18

18. Transverse yellow band on tergum 3 to some degree interrupted medially, that on 2 only slightly constricted medially ..... *heiligbrodtii* Cresson (p. 355)
Transverse yellow band on tergum 3 very narrow medially, but not interrupted 19

19. Transverse band on tergum 2 much constricted medially, not much wider than that on 3 at mid point ..... *texana* Cresson (p. 358)
Transverse band on tergum 2 only slightly constricted medially, being very much wider than that on tergum 3 ..... *wisconsinensis* Graenicher (p. 359)

20(14). Scape of antennae bulbous, the length only about 1.5 times the breadth at apex ..... *(Pachynomada) vincta* Say (p. 379)
Scape relatively slender, fully twice as long as the greatest breadth 21

21. Smaller (9 mm. or less); abdominal terga with lateral spots or interrupted bands *(Callinomada)* 22
Larger (12 mm. or more); abdominal terga with broad, conspicuous, entire, yellow bands *(Holonomada)* 24

22. Propodeum with a pair of large yellow maculae .. *rodecki* new species (p. 376)
Propodeum entirely black 23

23. Upper portion of clypeus black over nearly half of the median length; femora largely dark; tubercles strongly produced ... *aquilarum* Cockerell (p. 372)
Only the narrow upper margin of clypeus black; femora in large part testaceous; tubercles not greatly produced ..... *placida* Cresson (p. 374)

24(21). Basal vein interstitial with transverse median; propodeum entirely black, and pleura black except for a very small, anterior, yellow spot .... *superba* Cresson (p. 362)
Basal vein much basad of transverse median; pleura and propodeum with large yellow maculae ..... *affabilis* Cresson (p. 361)

25(13). Pygidium entire; basal vein usually interstitial with transverse median vein 26
Pygidium distinctly notched at apex . 28

26. Scutellum grooved medially .... *(Phor) integerrima* Dalla Torre (p. 377)
Scutellum rounded 27

27. Clypeus black across basal half, only the apical half yellow; scape entirely black .... *(Phor) proxima* Cresson (p. 378)
Clypeus yellow, only the very narrow basal margin black; scape yellowish anteriorly .... *orba* new species (p. 424)

28(25). With but two submarginal cells . 29
With the usual three submarginal cells 30

29. First recurrent vein interstitial with first transverse cubitus; all coxae black; face black between antennae and upper margin of clypeus ..... *detrita* new species (p. 414)
First transverse cubitus absent, the first recurrent far basad of second transverse cubitus; face entirely yellow below level of antennae ....*(Heminomada) obliterata* Cresson (p. 395)

30(28). Abdominal terga with broad, uninterrupted, transverse, yellow bands *(Heminomada)* 31
Abdominal terga either with lateral, widely separated, yellow maculations, or with transverse bands that are to some degree interrupted medially 41

31. Basal vein interstitial with transverse, median vein 32
Basal vein to some degree basad of transverse median 34

32. Median segments of flagellum broader than long . *salicis* Robertson (p. 428)
Median segments of flagellum longer than broad 33

33. Scutellum entirely yellow, and propodeum with small, but distinct, yellow maculations ..... *fragariae* new species (p. 391)
Scutellum black, with a pair of small, rounded, yellow maculations; propodeum entirely black ....*subrutila* Lovell & Cockerell (p. 398)

34(31). Propodeum entirely black 35
Propodeum with yellow maculations .. 38

35. Basal segment of flagellum fully as long as segment 2, measured on the longer, upper side; scutum and scutellum entirely black 36
Basal segment of flagellum little more than half the length of segment 2, even on upper side; scutellum with yellow maculations 37

36. Pronotal collar and scutellum bright yellow ..... *bishoppi* Cockerell (p. 383)
Pronotal collar, scutum and scutellum entirely black ..... *autumnalis* new species (p. 382)

37(35). Smaller (7 mm.); pronotum entirely black; antennal scape quite slender, only slightly broader than segments of flagellum ..... *ochlerata* new species (p. 396)
Larger; pronotum yellow; antennal scape bulbous, nearly twice as broad as the flagellar segments ..... *dentariae* Robertson (p. 386)

38(34). Basal segment of flagellum, measured along the longer side, nearly as long as segment 2 ..... *bishoppi* Cockerell (p. 383)
Segment 2 of flagellum about twice as long as basal segment 39

39. Scutum and scutellum red in large part ..... *bethuni* Cockerell (p. 382)
Scutum entirely black, scutellum with yellow maculations 40

40. Propodeal maculations small; mesopleura mostly black, with only an anterior yellow blotch; abdominal bands narrow.. ..... *sulphurata* Smith (p. 398)
Propodeal maculations large; mesopleura with a large yellow spot just beneath base of fore wing; abdominal bands broad, occupying a considerable portion of each tergum ..... *luteola* Lepeletier (p. 393)

41(30). Segments 2-7 of flagellum excavated beneath ..... *denticulata* Robertson (p. 411)
Flagellar segments not so modified .. 42

42. Apex of pygidium broadly truncate, very slightly incurved; scutellum red, deeply grooved ..... *mendica* new species (p. 422)
Apex of pygidium usually narrowed, quite deeply and distinctly notched; if at all broad, then scutellum rounded, and entirely black 43

43. Basal vein interstitial or nearly with transverse median vein 44
Basal vein distinctly basad of transverse median 47

44. Scutellum rounded, entirely black 45
Scutellum deeply grooved, either red or yellow 46

45. Abdominal terga 2 and 3 with lateral, widely separated, yellow maculations, the apical terga not maculated ..... *ulsterensis* new species (p. 433)
Terga 2-6 with transverse, yellow bands, those on 2 and 3 subinterrupted medially, the others entire ..... *townesi* new species (p. 432)

46(44). Abdominal terga with transverse, yellow bands that are entire or only slightly interrupted medially; scutum and propodeum in large part red ..... *indusata* new species (p. 418)
Abdominal terga 2 and 3 with lateral, widely separated, yellow maculations, remaining terga dark ..... *media* new species (p. 421)

47(42). At least upper half of clypeus black 48
Clypeus yellow in large part 49

48. Only the narrow apical rim of the clypeus yellowish or ferruginous, otherwise black; scape testaceous or yellow anteriorly ..... *vicina* Cresson (p. 434)
Apical half of clypeus yellow; scape black, with only the apex narrowly yellow .. .. *gracilis* Cresson (p. 416)

49(47). Abdominal terga 2 and 3 with transverse, yellow bands which are only slightly interrupted medially 50
Tergum 3, and usually 2 also, with lateral, yellow maculations which are rather widely separated 53

50. Scutellum yellow, at least in part ..... *armatella* Cockerell (p. 402)
Scutellum black or red, with no trace of yellow 51

51. Scutellum rounded posteriorly, median groove very shallow if at all evident. 52
Scutellum bilobed, having a distinct and often deep median groove ..... *cressonii* Robertson (p. 409)

52. Smaller (5.5-6.5 mm.); segment 2 of flagellum less than twice the length of segment 1 ... *sayi* Robertson (p. 428)
Larger (8-9 mm.); segment 2 of flagellum fully twice as long as segment 1.. ..... *dreisbachi* new species (p. 414)

53(49). Scutum to some degree red or ferruginous 55
Scutum entirely black 58

54. Very small (5 mm.); pleura and propodeum entirely black ..... *minima* new species (p. 423)
Somewhat larger; mesopleura to some degree red or yellow 55

55. Pronotum and scutellum bright yellow .. .. *sobrina* new species (p. 431)
Pronotum and scutellum red or black . 56

56. Segments 2 and 3 of flagellum subequal in length; abdominal terga 4-6 yellow maculated..*azaleae* new species (p. 403)
Segment 2 of flagellum considerably longer than 3; terga 4-6 usually not maculated ..... *pygmaea* Cresson (p. 426)

57(53). Tegulae unusually large, closely and coarsely punctate ..... *(Heminomada) electa* Cresson (p. 388)
Tegulae of normal size, usually rather finely or sparsely punctate 58

58. Pleura entirely black; or very dark red 59
Pleura with small, anterior, yellow maculations 62

59. Very small (5 mm.); median antennal segments very short, breadth fully equal to length; scutellum rounded, entirely black ..... *parva* Robertson (p. 425)
Larger; median segments of antennae somewhat longer than broad; scutellum with reddish maculae, to some degree grooved or impressed medially 60

60. Upper surface of scutellum shining between coarse and distinctly separated punctures .. *skinneri* Cockerell (p. 429)
Scutellum closely punctate 61

61. Scutellum entirely dark red, very deeply grooved; abdominal terga 4-6 not yellow maculated..*media* new species (p. 421)
Scutellum with a pair of small, red maculations, the median groove shallow; terga 4-6 to some degree yellow maculated ... *illinoensis* Robertson (p. 417)

62(58). Scutellum yellow .... *capillata* new species (p. 406)
Scutellum in part ferruginous, or largely black, with a pair of small yellow spots 63

63. Pronotum yellow, the lateral angles rounded; supraclypeal area yellow and pleura with small, anterior, yellow maculae ..... *ceanothi* Cockerell (p. 406)
Pronotum black, acutely angled laterally; supraclypeal area entirely black .... *banksi* Cockerell (p. 404)

Nomada (Gnathias) bella bella Cresson

Nomada bella Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 287. ♂.

Nomada bella Snodgrass, 1941. Smithsonian Misc. Coll. 99, pp. 55-56, pl. 27, fig. F-J.

Nomada albofasciata Smith, 1879. Descr. New Species Hym. Brit. Mus. p. 100. ♂. New synonymy.

MALE—Length 5.5-8.5 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum somewhat shorter than segment 2, median segments very slightly longer than broad, pedicel almost completely enclosed in the deep, apical excavation of the scape which is slightly broader than segments of flagellum; mandible with a distinct, inner, subapical tooth; wings hyaline basally, becoming lightly infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal in width anteriorly, veins chiefly testaceous, basal vein much basad of transverse median; tegulae somewhat shining, but with numerous, rather close, shallow and fine punctures; scutellum rounded, posterior margin only slightly grooved medially, if at all; front coxae simple; hind femora unmodified; head and thorax chiefly black, scape usually entirely black, clypeus except upper margin, labrum, mandibles except tips, and narrow lateral maculae extending narrowly up inner margin of eye to level of antennae, bright yellow; flagellum, tegulae and tarsi more reddish-testaceous; front and middle tibiae more or less testaceous, with some dark infusions, hind tibiae largely piceous, femora and coxae largely dark, spurs pale yellow; basal abdominal tergum largely piceous on basal half, with a pair of rather narrow, transverse, yellowish maculae on each side, apical area largely ferruginous; terga 2-6 with transverse, yellowish-white bands that are usually entire, apical margins of the plates broad, slightly depressed, largely yellowish-hyaline; head and thorax in large part coarsely rugoso-punctate, punctures becoming very fine and close below antennae and on clypeus, lateral maculated areas very sparsely and minutely punctate; abdominal terga minutely and very closely punctate basally, punctures very shallow and inconspicuous, becoming minute and indefinite toward the apical impressed areas, these smooth, shining, very sparsely punctate and yellowish-hyaline; pygidial plate rather strongly narrowed apically, tip narrow but deeply emarginate, lateral margins conspicuously carinate, surface very finely, closely and rather shallowly punctate; sternum 8 much as in *maculata* (fig. 98); genital armature somewhat as in *maculata*, but the elongate setae of the gonostyli forming a laterally projecting pencil, and setae on inner side of the gonostylus directed mesally; pubescence quite thin, entirely pale, erect and relatively elongate, more yellowish on head and thorax above, becoming whitish and more conspicuous below antennae, on cheeks below, and on thorax laterally.

DISTRIBUTION—Minnesota to Quebec

and Maine, south to Florida, March to August.

The recognition of a subspecies of *bella* in Colorado makes the subspecific designation of this typical form necessary.

Nomada (Gnathias) cuneata (Robertson)

Gnathias cuneatus Robertson, 1903. Canad. Ent. 35, p. 175. ♀ (♂?)
Gnathias cuneatus form *decemnotatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.
Gnathias cuneatus form *octonotatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.
Gnathias cuneatus form *sexnotatus* Robertson, 1903. Canad. Ent. 35, p. 176. ♀.
Gnathias cuneatus form *quadrisignatus* Robertson, 1903. Canad. Ent. 35, p. 176. ♀.
Gnathias cuneatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum nearly equal to segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings subhyaline, becoming quite deeply infuscated along outer margin and in region of marginal cell, with the usual three submarginal cells, 2nd very broad and 3rd much constricted anteriorly, veins piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct, and slightly separated punctures, these somewhat closer anteriorly and along inner margin; posterior margin of scutellum quite deeply grooved medially; front coxae simple; hind tibiae with 4 or 5 robust, elongate, dark, spine-like, apical setae; head and thorax red in large part, with black areas between and somewhat above antennae, in the ocellar triangle, on posterior half of cheeks, lateral and ventral portions of prothorax, a narrow median line on scutum, mid coxae, metapleura and adjacent area of propodeum, and median area of propodeal triangle; flagellum, tubercles, tegulae, and legs in part, somewhat more testaceous, spurs pale yellow; abdominal terga red in large part, basal tergum narrowly piceous at base, terga 2 and 3 with large, widely separated, bright yellow maculae; punctures of head and dorsum of thorax coarse, close, deep and distinct, somewhat more finely and closely so on scutellum and on cheeks below, very fine and close but quite distinct on clypeus; mesopleura rather coarsely rugoso-punctate, black areas of metapleura and propodeum somewhat more shallowly and obscurely rugose; basal area of terga 2-5 finely and very closely punctate, the apical impressed areas practically impunctate; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5; pubescence very short and inconspicuous, entirely pale, somewhat more copious on propodeum, pleura, cheeks and face.

DISTRIBUTION — Minnesota to Nova Scotia, south to North Carolina, May to July.

FLOWER RECORDS—Robertson (1929) records *cuneata* on *Achillea, Arabis, Arunchus, Cercis, Claytonia, Dentaria, Dirca, Ellisia, Nothoscordum, Osmorrhiza, Rhamnus, Rhus, Ribes, Salix, Taenidia, Viburnum* and *Zanthoxylum.*

It seems desirable to remove *cuneata* from synonymy with *lepida* Cresson because of the uncertainty with respect to this association of the sexes. Males which have been compared with the type of *lepida* have a somewhat different distribution from that of *cuneata* females in North Carolina, having been collected in the vicinity of Raleigh, in association with females which differ from *cuneata.* Females of *cuneata* have been collected only in the higher elevations, from 3,500 to 6,000 feet.

Nomada (Gnathias) lepida Cresson

Nomada lepida Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 288. ♂.

FEMALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes; longer side of basal segment of flagellum nearly equal to segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings subhyaline, becoming quite deeply infuscated along outer margin and in region of marginal cell, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct and slightly separated punctures, these somewhat closer anteriorly and along inner margin; posterior margin of scutellum quite deeply grooved medially; front coxae simple; hind tibiae with 3 or 4 robust, dark, spine-like, apical setae; head and thorax red in large part, with black areas between and somewhat above antennae, in the ocellar triangle, and on posterior half of cheeks, lateral and ventral portions of prothorax, a narrow median line on scutum, mid coxae, metapleura and adjacent area of propodeum, and median area of propodeal triangle; flagellum somewhat more brownish, tubercles, tegulae, and

legs in part, somewhat more testaceous, spurs pale yellow; abdominal terga red in large part, basal tergum narrowly piceous at base, terga 2 and 3 with large, widely separated, bright yellow maculae, 4 and 5 with faint yellowish maculae on each side, and 6 with a pair of subapical yellowish spots; punctures of head and thorax coarse, close, deep and distinct, somewhat more finely and closely so on scutellum and on cheeks below, very fine and close on clypeus; black areas of metapleura and propodeum somewhat more shallowly and obscurely rugose; upper half of propodeal triangle coarsely rugoso-striate; basal area of terga 2-5 finely and rather closely punctate, the apical impressed areas more minutely and sparsely punctate, apical margins becoming impunctate; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5; pubescence very short and inconspicuous, entirely pale, somewhat more copious on propodeum, pleura, cheeks and face.

MALE—Length 6.5-9 mm.; lateral ocelli slightly nearer margins of vertex than to each other; cheeks subequal to eyes in width; basal segment of flagellum shorter than segment 2, median segments no longer than broad, pedicel partially enclosed in excavated apex of scape which is considerably swollen; mandible with a distinct, inner, subapical tooth; wings subhyaline, somewhat infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd about as broad anteriorly as 3rd, veins brownish-testaceous, basal vein much basad of transverse median; tegulae shining between rather deep, distinct, fine punctures, these somewhat closer anteriorly; posterior margin of scutellum only very shallowly impressed medially; front coxae simple; hind femora unmodified; head and thorax black in large part, but clypeus, labrum, mandibles except tips, scape anteriorly, and lateral facial maculations extending narrowly up margin of eye to level of antennae, bright yellow; pronotum dorsally, tubercles and tegulae yellowish-testaceous; legs testaceous in large part, hind femora and coxae dark, spurs pale yellow; scutellum with a pair of small, slightly separated, yellow maculae, and mesopleura with a very small, anterior, yellow maculation, otherwise pleura, propodeum and scutum black; abdomen red in large part, basal tergum piceous at extreme base, with a pair of very small, submedian, widely separated, yellow maculations, terga 2 and 3 with broad, yellow maculations which nearly meet at mid-line, 4 and 5 with narrow and rather indefinite, transverse, yellow bands that are more or less interrupted medially and on each side, and 5 with a median, relatively short maculation; head and thorax rather coarsely rugoso-punctate, punctures closely crowded if individually distinct, face below antennae becoming minutely and very closely and obscurely punctate, especially on clypeus; discs of abdominal terga very finely and closely punctate basally, the broad, apical areas largely impunctate, more or less yellowish-hyaline; pygidial plate slighty narrowed apically, rather broadly subtruncate, apical emargination very shallow, if evident, lateral margins carinate, surface closely and shallowly punctate; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence very short, rather inconspicuous, entirely pale, hardly evident on the more basal segments of the abdomen.

DISTRIBUTION—Minnesota to Maine, south to Georgia, March to July.

FLOWER RECORDS — *Brassica, Fragaria, Geranium, Ilex, Prunus, Pyracantha, Pyrus* and *Rubus.*

Nomada (Gnathias) hydrophylli Swenk

Nomada (Gnathias) hydrophylli Swenk, 1915. Nebr. Univ., Studies 15, p. 25. ♂.

Gnathias xanthoparius Robertson MS, 1928. Nom. nud. Flowers and Insects, Carlinville, Ill., pp. 9, 101, 111, 152. ♂.

MALE—Length 6.5-9.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width; basal segment of flagellum much shorter than segment 2, median segments slightly longer than broad, pedicel enclosed in the deeply excavated apex of the scape, the latter considerably swollen; mandible with a distinct, inner, subapical tooth; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd subequal in width anteriorly, veins testaceous, basal vein much basad of transverse median; tegulae finely, rather closely and obscurely punctate; posterior margin of scutellum quite deeply grooved; front coxae simple; hind femora unmodified; median area of face and most of cheeks black, the clypeus, labrum, mandibles except tips, and lower angle of cheeks back of eyes, yellow, with yellow lateral facial maculae which extend narrowly up inner margin of eye to level of antennae; upper portion of face adjacent to eyes more ferruginous, this extending narrowly back of ocelli across vertex; scape and flagella more yellowish-testaceous, somewhat darker above; mesopleura with a large, lateral, testaceous maculation which encloses a bright yellow anterior spot; scutum with a rather broad, median, black band, ferruginous on each side,

scutellum, metanotum and two parallel areas on propodeum, ferruginous; propodeum black medially and on each side, metapleura, mid coxae and venter of thorax black in large part; pronotum, tubercles and tegulae more yellowish-testaceous, legs largely testaceous apically, but mid and hind femora more or less darkened, spurs pale yellow; abdominal terga dull red in large part, basal tergum piceous across basal half, terga 2 and 3 with broad, extensive, bright yellow maculae laterally which are rather widely separated medially, following terga usually not maculated; punctures coarse, deep and contiguous over most of head and thorax, becoming somewhat finer but very close on cheeks below, and fine and close on lower half of face, minute and obscure but very close on clypeus; punctures of abdominal terga minute, quite close over basal areas, becoming somewhat more minute and indefinite toward the narrowly impunctate apical margins, these becoming somewhat yellowish-hyaline; pygidial plate rather strongly narrowed apically, apex quite deeply emarginate, lateral margins carinate, surface very finely and closely punctate; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence entirely pale, short and thin, but rather copious, over head and thorax, hardly evident on abdomen basally but becoming copious on the more apical segments.

DISTRIBUTION—North Dakota, Illinois and Maryland, May and June.

FLOWER RECORDS—The type series was collected on *Hydrophyllum, Viola* and *Zizia.* Robertson (1929) records this species (as *xanthoparius* MS) also on *Arabis* and *Polemonium.*

Nomada (Gnathias) louisianae Cockerell

Nomada (Gnathias) louisianae Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 602. ♀.

FEMALE—Length 5-6.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes; longer side of basal segment of flagellum about equal to segment 2, the more median segments little if any longer than broad; mandible with a distinct, inner, subapical tooth; wings hyaline basally, becoming lightly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd about equal on anterior margin, veins testaceous to piceous, basal vein much basad of transverse median; tegulae very finely, closely punctate throughout; posterior margin of scutellum very slightly impressed medially; front coxae simple; hind tibiae with a pair of elongate, rather robust, apical, seta-like hairs; head and thorax chiefly red, with a very small, black area between antennae and between the ocelli, pronotum with a limited black area on each side anterior to tubercles; scutum with a median, conspicuous, black line that reaches nearly to posterior margin, posterior face of propodeum with a narrower median, black line, mid coxae and adjacent area of metapleura black above, and some black areas immediately back of wings bases; lower part of face becoming somewhat paler yellowish, the antennae, tubercles and tegulae largely testaceous; legs testaceous in part, spurs pale yellow; abdomen largely red, with only very obscure, widely separated, small, yellow maculations on 2 and 3; head and thorax quite coarsely rugoso-punctate in general, punctures becoming much finer and quite densely crowded below antennae and on clypeus, relatively coarse on cheeks below, discs of abdominal terga minutely and quite closely punctate basally, becoming impunctate on the broad, rather shallowly impressed, apical margins, these becoming more yellowish-hyaline; pseudopygidium very short, transverse, forming the rather short, truncate, apical margin of tergum 5; pubescence short and inconspicuous, entirely pale, somewhat more copious on face and cheeks below, on pleura and on propodeum.

MALE—Length 6-6.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes; longer side of basal segment of flagellum fully equal to segment 2 in length, median segments about as broad as long, pedicel largely hidden in the deeply excavated apex of the scape which is somewhat swollen; mandible with a distinct, inner, subapical tooth; wings subhyaline, faintly clouded along apical margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd nearly equal on anterior margin, veins testaceous, basal vein much basad of transverse median; tegulae shining, punctures minute and rather sparse and irregular; posterior margin of scutellum only faintly impressed medially, if at all; front coxae simple; hind femora unmodified; head and thorax chiefly black, clypeus, labrum, mandibles except tips, scape anteriorly, and lateral facial maculae extending narrowly up margin of eye to level of antennae, bright yellow; tubercles, tegulae, and a small anterior spot on mesopleura, yellowish, the legs largely testaceous, spurs pale yellow; propodeum and metanotum ferruginous; abdominal terga reddish in large part, basal tergum piceous over basal half, following terga with lateral, more or less transverse, yellow maculations which nearly meet medially on 2 and 3, rather widely separated on 4, becoming

narrower and less evident on 5 and 6; head and thorax in large part densely and rather coarsely rugoso-punctate, punctures becoming very fine and close on clypeus, very sparse on maculated areas at each side; discs of abdominal terga with minute and quite close punctures, apical impressed areas becoming more sparsely and minutely punctate to the impunctate rims, these largely yellowish-hyaline; pygidial plate rather strongly narrowed apically, tip rather narrowly and deeply emarginate, margins carinate, surface very finely and obscurely rugose; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence entirely pale, short, thin and rather inconspicuous, but somewhat more copious on face and cheeks below, on pleura, and on propodeum.

DISTRIBUTION—Nebraska and Minnesota to New York and South Carolina, April and May.

The male of *louisianae* has not been recognized before. Its recognition and description here is based on a series of 5 males and one female bearing the same data—from Afton, Minnesota (Don Murray). The female has been compared with the holotype and appears to be identical.

Nomada (Gnathias) maculata Cresson

(Figs. 98 & 100)

Nomada maculata Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 303. ♀ ♂.?

Nomada volatilis Smith, 1879. Descrip. New Species Hym. Brit. Mus., p. 100. ♂.

FEMALE—Length 8.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum subequal to segment 2, median segments considerably longer than broad; mandible with a distinct, inner, subapical tooth; wings subhyaline, narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, the 2nd very broad anteriorly, 3rd narrowed nearly to a point, veins piceous, basal vein much basad of transverse median; tegulae shining between rather coarse, close, deep and distinct punctures, these becoming more sparse toward outer and posterior margins; posterior margin of scutellum shallowly impressed medially; front coxae simple; hind femora unmodified, their tibiae with a pair of robust, rather elongate, piceous, apical setae; head and thorax red in large part, with a small amount of black on cheeks posteriorly, metapleural sutures, mid coxae, and a narrow, median, black line on scutum; antennal flagellum more brownish, tegulae more testaceous; abdominal terga red, depressed apical margins becoming more yellowish-hyaline toward rims, terga 1 and 2 with widely separated, lateral, yellow maculations, 3 with a median, yellow, transverse band which is interrupted medially and to some degree on each side; tergum 5 with a pair of large, submedian, yellow maculae which are nearly continuous medially; upper part of face and dorsum of thorax with coarse, deep, distinct and close punctures, these crowded in large part but distinct, becoming somewhat finer and closer on cheeks below, very fine, close and rather indefinite on clypeus, but quite coarse and well separated on each side below antennae; mesopleura somewhat more finely rugose; discs of abdominal terga finely, closely and quite distinctly punctate, punctures becoming minute and indefinite toward apical margin of each plate; pseudopygidium very narrow, transverse, covered with silvery tomentum, and forming the truncate, apical margin of tergum 5; pubescence entirely pale, very short and inconspicuous in general, but rather dense on mesopleura, on front and hind coxae, and on posterior face of propodeum, but triangle bare.

MALE—Length 8.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad, pedicel partially enclosed in the deeply concave apex of scape; mandibles with a distinct, inner, subapical tooth; wings subhyaline, rather narrowly and lightly infuscated along apical margin and in region of marginal cell, with the usual three submarginal cells, 2nd very broad anteriorly, 3rd narrowly constricted, veins piceous, basal vein much basad of transverse median; tegulae shining between rather close, deep and distinct punctures; posterior margin of scutellum only very shallowly impressed medially, front coxae simple; hind femora unmodified; hind tibiae with two or three slender, rather elongate, spine-like, apical setae; head in large part black, the clypeus, labrum, mandibles except apex, scape anteriorly, a pair of lateral facial maculae that extend narrowly up margin of eye about to level of antennae, and a pair of small yellow maculations above, bright yellow (fig. 100); thorax black, scutum with more or less extensive ferruginous infusions, scutellum and metanotum entirely ferruginous, margin of pronotum yellow, tubercles becoming more testaceous, and tegulae testaceous, legs testaceous to ferruginous, spurs pale yellow; abdominal terga largely red, with transverse, yellow bands, basal tergum black at extreme base, with a pair of rather small, median, interrupted

transverse bands, tergum 2 largely yellow across basal part of disc, the shallowly impressed apical area red; tergum 3 quite similar to 2, 4 and 5 with narrower, transverse, yellow bands which are subinterrupted medially, impressed apical areas becoming somewhat more yellowish; tergum 6 with a subapical, more median, yellow area, blackish at base; head and thorax in general very coarsely and closely punctate, punctures of face above and vertex quite distinct, becoming minute and close on clypeus, and becoming densely crowded but quite coarse on cheeks below; punctures densely crowded over most of thorax; abdominal terga finely, closely and rather shallowly punctate basally, impressed apical margins becoming very minutely and obscurely punctate; pygidial plate (fig. 98) rather strongly narrowed apically, with a deep, apical, rounded emargination, lateral margin strongly carinate, surface quite closely and very finely punctate; pubescence entirely pale, quite short, more or less erect, rather copious over most of head and thorax, very short on abdomen basally, becoming somewhat more elongate and conspicuous apically; sternum 8 with a slender apical projection which is slightly down-curved at apex, conspicuously fringed on each side; gonostyli of genital armature (fig. 98) robust, nearly equal to gonocoxites in length, densely clothed with fine, elongate hairs, and with a basal protuberance beneath which bears a tuft of elongate hairs.

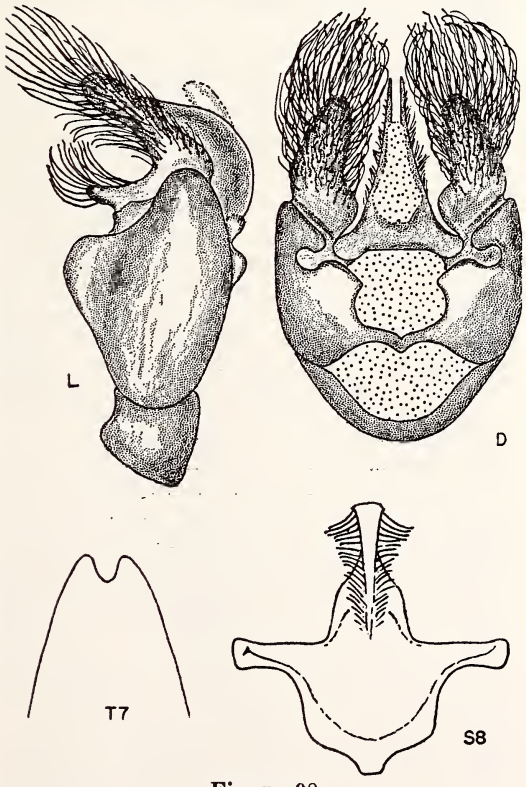


Figure 98
Tergum 7, sternum 8, and dorsal and lateral views of genital armature in male of *Nomada maculata.*

DISTRIBUTION—Minnesota to Maine, south to Virginia, March to June.

Nomada (Gnathias) ovata (Robertson)

Gnathias ovatus Robertson, 1903 (June). Canad. Ent. 35, p. 175. ♀ ♂.

Gnathias ovatus form *plenus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *octomaculatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *sexmaculatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *quadrimaculatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *binotatus* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Gnathias ovatus form *unicolor* Robertson, 1903. Canad. Ent. 35, p. 175. ♀.

Nomada (Gnathias) carolinae Cockerell, 1903. (Aug.) Acad. Nat. Sci. Phil. Proc. 55, p. 602. ♀. New synonymy

Gnathias ovatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 6.5-10 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks much narrower than eyes; longer side of basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; mandible with a distinct, subapical, inner tooth; wings subhyaline, rather deeply infuscated along the narrow apical margin and in marginal cell, with the usual three submarginal cells, 2nd quite broad anteriorly, 3rd much more restricted, veins piceous, basal vein much basad of transverse median; tegulae somewhat shining between deep, distinct, uniformly close punctures; posterior margin of scutellum slightly impressed medially; front coxae simple; hind tibiae with two or three elongate, rather robust, seta-like, apical hairs; head and thorax chiefly red, with some black between and above antennae, in ocellar triangle and along posterior margin of cheeks, narrowly yellow along margin of eyes below antennae; pronotum black in part on each side anterior to tubercles, metapleura largely black, scutum with a median black line, and posterior face of propodeum narrowly black medially;

tubercles, tegulae, and legs in part, testaceous, spurs pale yellow; abdominal terga largely ferruginous, terga 2 and 3 with rather small, and widely separated, bright yellow maculae; apical margins of all terga becoming more or less yellowish-hyaline toward rims; pseudopygidium transverse and very short, forming the rather short, truncate, apical margin of tergum 5; pubescence short, thin, suberect, rather copious over most of head and thorax, very thin and sparse, hardly evident on abdomen.

MALE—Length 7-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes; longer side of basal segment of flagellum about equal to segment 2 in length, median segments only about as long as broad, pedicel largely hidden in the deeply concave apex of the scape, the latter quite broad, diameter considerably greater than that of flagellum; mandible with a distinct, inner, subapical tooth; wings subhyaline, somewhat narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd not much broader anteriorly than 3rd, veins piceous, basal vein much basad of the transverse median; tegulae shining, punctures very fine and close in large part; posterior margin of scutellum quite deeply grooved medially; front coxae simple; hind femora unmodified; head largely black, the clypeus, labrum, mandibles except tips, lateral facial maculations which extend narrowly up margin of eye to level of antennae, and narrow, posterior border of eye below, bright yellow; antennal scape and flagellum more testaceous; upper surface of pronotum, tubercles and tegulae reddish-testaceous; scutum, scutellum and mesopleura red, scutum with a median black line, pleura with a small, anterior, yellow spot; propodeum and metapleura black; legs largely testaceous, mid and hind femora black in part, spurs pale yellow; propodeum and metapleura entirely black; abdominal terga ferruginous, 2 and 3 with lateral, more or less widely separated, yellow maculae, nearly contiguous in some specimens, and terga 1 and 4-6 sometimes maculated; head and thorax rather coarsely rugoso-punctate, especially on upper part of head and on dorsum of thorax, punctures minute, very close and obscure on clypeus; triangle of propodeum coarsely striate; abdominal terga shining, very finely and closely punctate on discs basally, punctures becoming more sparse, minute and obscure toward apical margins; pygidial plate narrowed apically, tip deeply incised or emarginate, lateral margins carinate, surface quite closely and finely punctate; sternum 8 and genital armature much as in *maculata* (fig. 98); pubescence entirely whitish, short and thin in general, but rather copious on face and cheeks below and on mesopleura and propodeum, very thin, barely evident on abdominal terga, becoming somewhat more elongate apically.

DISTRIBUTION—Minnesota to Maine, south to South Carolina, March to July.

FLOWER RECORDS—*Ceanothus, Fragaria, Rubus, Salix* and *Toxicodendron.* Robertson (1929) records *ovata* on *Anemonella, Antennaria, Arabis, Aruncus, Claytonia, Dentaria, Hydrophyllum, Lithospermum, Nothoscordum, Polemonium, Prunus, Ptelea, Ranunculus, Ribes, Stellaria, Taenidia, Viburnum, Zanthoxylum* and *Zizia.*

Nomada (Gnathias) perplexa Cresson

Nomada perplexa Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 306. ♀ ♂.

Nomada (Gnathias) perplexa Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 600. ♀ ♂.

Nomada lchighensis Cockerell, 1903. Op. cit., p. 605. (♂ only)

Nomada (Gnathias) cornelliana Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 84. ♂. New synonymy.

FEMALE—Length 6-8 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings lightly infuscated, more deeply so along the narrow apical margin, with the usual three submarginal cells, basal vein much basad of transverse median vein, the veins piceous; tegulae shining between quite deep and distinct, well separated punctures, these becoming quite close anteriorly; posterior margin of scutellum deeply depressed medially; front coxae simple; hind tibiae with 3 or 4 long, robust setae apically; clypeus, labrum, mandibles, and a narrow line encircling eyes, ferruginous, head otherwise chiefly black, scape and basal segment of flagellum more ferruginous in front, the flagellum otherwise brownish-ferruginous beneath, blackish or piceous above; scutellum and metanotum chiefly ferruginous, scutum largely black, with ferruginous infusions, and pleura to some degree ferruginous medially; margin of pronotum, tubercles, tegulae, and legs in large part, testaceous, the femora more or less blackened toward base, spurs pale yellow; metapleura and propodeum entirely black; abdominal terga largely red, becoming piceous at extreme base and somewhat yellowish-hyaline on apical margins of the more apical terga; terga 2 and 3 with lateral, wide-

ly separated, yellow maculations; head and thorax very coarsely, deeply and closely punctate, becoming somewhat finer below antennae, very fine and indefinite on clypeus; abdominal terga largely smooth and shining, punctures very obscure except over basal area of disc on tergum 2 where punctures are distinct but fine and slightly separated, interspaces somewhat exceeding diameter of punctures; pseudopygidium transverse, pale in color, forming the narrow, apical margin of tergum 5; pubescence short, thin and inconspicuous, entirely pale over head and thorax, and pale also on abdomen where evident.

MALE—Length 6-9 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments only slightly longer than broad, pedicel largely hidden in the deeply excavated apex of the scape; mandible with a distinct, inner, subapical tooth; wings subhyaline or faintly infuscated, rather deeply so along the narrow apical margin, with the usual three submarginal cells, veins brownish, basal vein much basad of transverse median vein; tegulae shining between deep, distinct, slightly separated and rather coarse punctures; posterior margin of scutellum quite deeply depressed medially; front coxae entirely simple; hind femora simple, hind tibiae with two or three elongate setae apically; head and thorax black in general, the clypeus, labrum, mandibles basally, and narrow area between clypeus laterally and lower end of eye, bright yellow; antennae brownish-ferruginous; scutellum and a small anterior maculation on pleura, ferruginous; margin of pronotum, tubercles, tegulae, and legs in large part, somewhat reddish-testaceous, spurs yellow; abdomen chiefly ferruginous, the extreme base blackish, apical margins of the terga more or less yellowish-hyaline, terga 2 and 3 with lateral, widely separated, bright yellow maculations; head and thorax in general coarsely rugoso-punctate, punctures becoming finer below antennae, very minute and obscure on clypeus; abdominal terga shining, punctures very fine but evident on discs, separated by slightly more than their diameter, the depressed apical margins shining and impunctate; pygidial plate carinate laterally, slightly narrowed toward the deeply incised apex, surface finely and rather closely punctate; sternum 8 and genital armature much as in *maculata* (fig. 98).

DISTRIBUTION—Minnesota to Massachusetts, south to Tennessee and North Carolina, April to July.

FLOWER RECORDS — *Ceanothus, Chrysanthemum* and *Salix*.

Nomada (Gnathias) subnigrocincta Swenk

Nomada (Nomada) subnigrocincta Swenk, 1915. Nebr. Univ. Studies 15, p. 155. ♀. (♂ misident.)

FEMALE—Length 7 mm.; lateral ocelli subequally distant from margin of vertex and each other, somewhat more distant from eyes; cheeks about equal to eyes in width, posterior margin obscurely carinate; longer side of basal segment of flagellum equal to segment 2, median segments considerably longer than broad; mandibles with a distinct, inner, subapical tooth; wings hyaline basally becoming faintly brownish apically, a hyaline area just beyond the discoidal and submarginal cells, veins and stigma brownish-testaceous, with the usual three submarginal cells, 2nd considerably broader than 3rd anteriorly, basal vein much basad of transverse median; tegulae testaceous, smooth and shining, with very minute and rather close punctures which become very sparse along outer margin; scutellum with a very faint, median impression or groove; anterior coxae not spined; apex of hind tibiae with 4 or 5 elongate, seta-like hairs; head testaceous in large part, antennal scape, clypeus, labrum and mandibles somewhat more yellowish, supraclypeal area, surface above antennae, around ocelli and posterior half of cheeks, black, antennal flagellum, more brownish-testaceous; scutum, scutellum and mesopleura reddish-testaceous, scutum with a median black line which broadens posteriorly toward scutellum, mesopleura with a large blackened area beneath, metapleura and adjacent lateral faces of propodeum blackish, propodeum posteriorly more testaceous; legs largely testaceous, spurs pale yellow; abdominal terga yellowish-red medially, darker apically, 2 and 3 with obscure, lateral, yellow maculations which are broadly separated and rather indefinite; sterna yellowish-testaceous, margins somewhat darker; head coarsely and closely punctate above and on cheeks, somewhat more finely so on lower part of face and clypeus; scutum, scutellum and mesopleura very coarsely rugoso-punctate, propodeum much more finely so, but triangle impunctate below, becoming rather broadly striate toward upper margin; punctures of abdominal terga very minute and close, barely visible; pseudopygidium transverse and very narrow, of the usual form; pubescence very short and thin, somewhat more copious on head and on thorax laterally and posteriorly, very thin but evident on dorsum of thorax, very short and obscure, barely evident on abdomen basally, the more apical terga with some thin, more elongate, pale hairs.

DISTRIBUTION — The type specimen was collected in New Jersey, in May.

This description and the modification of the classification of this species is based on the holotype. Two additional specimens have been found, one from Massachusetts and the other from North Carolina, which are quite similar to the holotype, but their true identity is uncertain. The male appears to be the same as *ulsterensis* (p. 000) and is not in *Gnathias*.

Nomada (Micronomada) fervida Smith

(Fig. 99)

Nomada fervida Smith, 1854. Cat. Hym. Brit. Mus., 2, p. 247. ♀.

Nomada (Micronomada) crassula Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 610.

FEMALE—Length 10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks narrow, less than half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles slender and simple; wings quite deeply infuscated, with the usual three submarginal cells, the 2nd very broad anteriorly, 3rd much narrowed, veins piceous, basal vein interstitial with transverse median; tegulae shining, with only a few scattered, very sparse punctures; posterior margin of scutellum quite deeply depressed medially, front coxae with elongate spines, these often obscured by pubescence; apex of hind tibiae with a dense transverse patch of extremely short, dark setae, without elongate hairs or setae; labrum, mandibles, scape and pedicel yellowish-ferruginous, the clypeus yellowish or black, face with extensive, lateral, yellow maculae reaching from lateral margins of clypeus nearly to top of eye, cheeks narrowly ferruginous along margin of eye, head otherwise black, the antennal flagellum brownish-piceous; pronotal collar, tubercles, tegulae, scutellum laterally, metanotum and a posterior spot on mesopleura, bright yellow; scutellum ferruginous medially and narrowly across anterior margin, legs ferruginous basally, becoming somewhat more testaceous on apical tarsal segments, spurs pale yellow; basal abdominal tergum with a very narrow, transverse, subapical, yellow band; tergum 2 with a similar yellow band which is quite broad laterally, somewhat narrowed medially; transverse band of tergum 3 interrupted medially and at each side, resulting in four transverse spots which may be much reduced or lacking in some specimens; tergum 4 with a transverse band which is interrupted on each extreme side; and tergum 5 with a pair of more or less separated yellow spots on each side of mid-line; abdominal sterna entirely black; punctures of head and thorax very coarse and deep in general, close between antennae and ocelli, somewhat more sparse on maculated areas at sides of face, deep and close on supraclypeal area, and somewhat finer but distinct and slightly separated on clypeus, fine but deep and distinct on vertex and cheeks; scutum very coarsely rugoso-punctate, but with a very few narrow, shining, interspaces evident, somewhat finer and distinct on scutellum, well separated on pleura below, becoming very close above; propodeum dull, very finely and closely punctate laterally, somewhat more coarsely so on posterior face, triangle smooth but rather dull; abdominal tergum 1 shining, punctures extremely minute across base, but with some more definite and distinct punctures between the transverse yellow band and apical margin, these becoming more minute toward the rim; discs of terga 2-4 with deep, distinct, close and uniform punctures, apical rims narrowly impunctate; punctures of tergum 5 deep and distinct but much more widely separated; pseudopygidium transverse, forming the truncate apical rim of tergum 5, densely covered with very short, subappressed, yellowish setae; pubescence extremely short, thin, sparse and obscure throughout, entirely whitish.

MALE—Length 10 mm.; lateral ocelli slightly nearer to each other than to margin of vertex; cheeks narrow, about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments very short, slightly broader than long; mandibles slender and simple; wings quite deeply infuscated, with the usual three submarginal cells, the 2nd very broad anteriorly, 3rd strongly narrowed, veins piceous, stigma more yellowish, basal vein interstitial with transverse median; tegulae shining, with only a few scattered, very sparse punctures; posterior margin of scutellum quite deeply depressed medially; front coxae with slender, elongate spines that are usually obscured by pubescence; hind femora unmodified; lower half of face largely yellow, only the supraclypeal area black, this sometimes extending downward onto upper portion of clypeus, the lateral maculations extending more narrowly along margin nearly to top of eye, basal half of mandibles bright yellow, becoming darker at tip, labrum more yellowish-ferruginous, head otherwise black, but cheeks above with a small yellow spot; pronotal collar, tubercles, tegulae, scutellum on each side, metanotum, and a posterior spot on mesopleura, bright yellow; scutellum ferruginous medially and along anterior margin, legs more testaceous, spurs pale

yellowish; basal abdominal tergum with a narrow, entire, subapical yellow band; tergum 2 with a similar but very broad, entire band which is slightly narrowed medially; terga 3-5 with very narrow yellow bands which are more or less interrupted medially and at each side, resulting in four rather narrow, transverse, yellow maculations, 6 entirely black; abdominal sterna entirely black; punctures of head and thorax in general very coarse, deep and close, somewhat finer and more widely separated on face laterally and below, rather fine but distinct and slightly separated on clypeus, somewhat finer and close on vertex and cheeks; scutum more rugoso-punctate, punctures of scutellum somewhat more distinct, pleura below with some shining interspaces evident but becoming rather densely rugose above; propodeum dull, very finely and rather densely punctate laterally, punctures of posterior face somewhat coarser but very close, triangle smooth but rather dull and tessellate; basal abdominal tergum shining, almost impunctate, with only very fine but distinct punctures between transverse band and apical rim; discs of terga 2-5 deeply, distinctly, quite closely and rather coarsely punctate, with only the narrow apical rims becoming impunctate, these more or less yellowish-hyaline; punctures on tergum 6 somewhat coarser, deep, distinct and more widely separated but not sparse; pubescence extremely short and obscure, entirely white where visible; basal width of pygidial plate about equal to length, quite strongly narrowed apically and with a deep median apical incision, lateral margins carinate, surface rather smooth but with scattered, fine punctures; sternum 8 as in *modesta* (fig. 101); genital armature much as in *modesta* (fig. 101) but gonocoxites (fig. 99) with robust and rather elongate basal lobes.

DISTRIBUTION—Florida, Georgia and South Carolina, March to September.

FLOWER RECORDS—*Bidens*, *Ceanothus*, *Melilotus* and *Polygonum*.

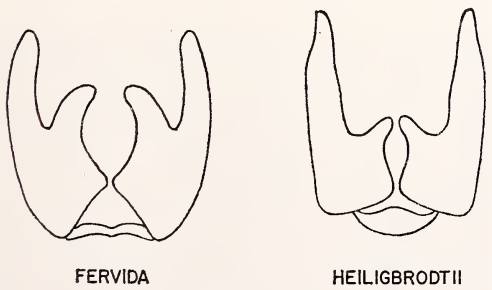


Figure 99
Gonocoxites of genital armature in males of *Nomada fervida* and *N. heiligbrodtii*.

Nomada (Micronomada) heiligbrodtii Cresson

(Fig. 99)

Nomada Heiligbrodtii Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 75. ♀.

Nomada (Micronomada) tiftonensis Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 610. ♂. New synonymy.

Nomada (Micronomada) modesta rivertonensis Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 22, p. 610. ♀. New synonymy.

Nomada heiligbrodtii Cockerell, 1919. U. S. Natl. Mus. Proc. 55, p. 180. ♂.

FEMALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks very narrow, less than half width of eye; shorter side of basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles simple; wings rather deeply infuscated, with the usual three submarginal cells, 2nd very broad anteriorly, 3rd somewhat narrowed anteriorly, veins piceous, stigma somewhat more ferruginous, basal vein interstitial with transverse median vein; tegulae shining, with only a small area on inner margin with fine and rather obscure punctures; posterior margin of scutellum with a very narrow, slight, median depression; front coxal spines rather short but slender and distinct, usually obscured by pubescence; apex of hind tibiae with a row of five or six, rather short but well developed, yellowish setae; face including clypeus black except for a pair of extensive, lateral, yellow maculations reaching from upper half of clypeus to slightly above level of antennae; mandibles yellow basally and a small yellow spot behind each eye above, labrum dull testaceous, antennal scape more ferruginous, flagellum brownish below, more piceous above; pronotal collar, tubercles, tegulae, scutellum except mid-line and anterior margin, metanotum, and a large, transverse, yellow maculation on mesopleura, bright yellow; legs reddish-testaceous basally, with yellow basal and apical areas on tibiae, these more or less connected; abdominal terga 1-5 with transverse, subapical, yellow bands, these somewhat narrowed medially, or narrowly interrupted on 3, more extensive on 2, sterna entirely black; punctures coarse, close and deep below ocelli, becoming rather sparse below antennae, very fine, irregular and sparse on the shining clypeus, somewhat finer but deep, distinct and rather close on cheeks, well separated between eyes and ocelli above, quite close and finer across vertex; scutum coarsely rugoso-punctate, punctures somewhat more distinct near center posteriorly, punctures of scutellum equally coarse and deep but quite

distinct, those on pleura below rather well separated, becoming densely crowded above maculation and below wing bases; propodeum dull, finely and rather closely and irregularly punctate laterally, posterior face somewhat more coarsely, deeply and irregularly punctate, triangle impunctate, rather smooth but dull; punctures of basal abdominal tergum extremely minute basally, becoming more distinct between maculation and apical rim, 2-5 with close, deep, distinct and rather fine punctures, uniformly distributed in general, becoming more minute to the narrowly impunctate, apical rims; pseudopygidium transverse, forming a rather short, truncate, apical margin of tergum 5, densely covered with pale yellowish, suberect hairs; pubescence extremely sparse, short and thin, hardly evident, entirely pale where visible.

MALE—Length 7-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments slightly broader than long; mandibles slender and simple; wings rather deeply infuscated, with the usual three submarginal cells, veins testaceous to piceous, stigma somewhat more ferruginous, second submarginal cell quite broad anteriorly, anterior width of 3rd about half that of 2nd, transverse median vein slightly basad of basal vein; tegulae shining, with only a very few sparse, obscure punctures; posterior margin of scutellum very slightly impressed medially; front coxal spines well developed but largely obscured by pubescence; hind femora unmodified; lower half of face, including labrum and mandibles, entirely yellow, reaching narrowly nearly to top of eye on each side, cheek with a small yellow spot near top of eye, and antennal scape yellow anteriorly; flagellum brownish-testaceous beneath, considerably darker above; pronotal collar, tubercles, tegulae, scutellum except mid-line, median part of metanotum and a broad, extensive, transverse yellow maculation on pleura, bright yellow; legs more testaceous basally, more or less infused with black on hind femora, tibiae more or less yellow at base and apex, these maculae usually connected, and tarsi and spurs yellow; abdominal terga 1-5 with transverse, subapical, yellow bands, this rather narrow on 1, very broad and expansive on 2, interrupted on 3, tergum 6 with a more obscure, subapical band which is interrupted medially; sternal plates entirely black; punctures of face deep and distinct, rather coarse, somewhat separated between antennae and ocelli, becoming rather sparse between ocelli and eyes, and quite sparse on lower half of face, much finer and quite close on cheeks and vertex; scutum very coarsely rugoso-punctate, punctures becoming more distinct and slightly separated on scutellum, slightly separated but very coarse and deep on pleura below, becoming somewhat closer but still distinct above; propodeum rather dull, punctures fine, shallow and irregular on lateral faces, scattered and irregular on posterior face, triangle impunctate, rather smooth but dull; basal abdominal tergum shining, the more basal punctures minute and obscure, becoming more distinct but still very fine on the maculated band and area between this and the rim; discs of terga 2-6 with fine, close, deep and distinct punctures, these reaching nearly to the very narrow, impunctate, apical rims, punctures somewhat more coarse and distinct on the more apical terga; pubescence very short, thin and obscure, entirely pale where evident; basal width of pygidial plate somewhat less than median length, slightly narrowed apically, with a rather shallow, triangular, median emargination, carinate laterally, surface very finely and shallowly punctate; sternum 8 as in *modesta* (fig. 101); genital armature much as in *modesta* (fig. 101) but gonocoxites (fig. 99) with short and rather slender basal lobes, and the gonostyli very short.

DISTRIBUTION—Michigan to the New England states, south to Florida, June to October, with early records during April and May in Florida.

FLOWER RECORDS—*Bidens*, *Chrysopsis*, *Haplopappus*, and *Solidago*.

Nomada (Micronomada) modesta Cresson

(Figs. 100 & 101)

Nomada modesta Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 286. ♀ ♂.

Nomada (Micronomada) modesta var. *vegana* Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 5, p. 610. ♀.

Nomada (Micronomada) vegana var. *nitescens* Cockerell, 1905. Colo. Agr. Expt. Sta. Bul. 94, p. 76. ♀.

FEMALE—Length 8.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about half width of eyes; shorter side of segment 1 of flagellum fully equal to segment 2, median segments about as long as broad; mandibles slender and simple; wings rather deeply infuscated, with the usual three submarginal cells, 2nd submarginal very broad anteriorly, 3rd strongly narrowed, veins piceous, stigma more testaceous, basal vein interstitial with transverse median vein; tegulae shining between numerous, rather fine and well separated punctures; posterior mar-

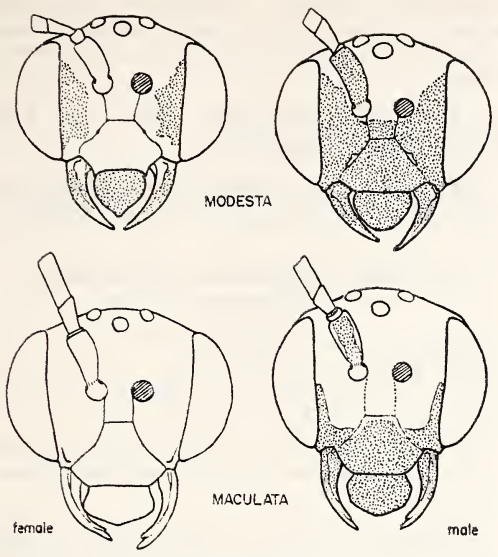


Figure 100
Facial views of heads of males and females of *Nomada maculata* and *N. modesta*.

gin of scutellum shallowly depressed medially; front coxal spines well developed, somewhat obscured by pubescence; apex of hind tibiae very densely fringed with short, silvery tomentum, without elongate hairs or setae; face black except for a pair of extensive, lateral, triangular yellow maculations, reaching from slightly below upper margin of clypeus, terminating narrowly on eye margin considerably above antennae (fig. 100); scape of antennae yellow anteriorly, labrum somewhat reddened, and mandibles basally more or less reddish-testaceous, a very small yellow maculation behind each eye above; pronotal collar, tubercles, tegulae, two large lateral maculations on scutellum, median portion of metanotum, a pair of rather small maculations on pleura which are more or less connected, and a spot on each side of posterior face of propodeum, bright yellow; scutellum black medially and along basal margin; abdominal terga 1-5 with transverse, subapical, yellow bands which are more or less strongly constricted medially, more or less interrupted on 3-5, much broadened at each side; abdominal sterna entirely black; punctures coarse, deep and close on face above and vertex, becoming somewhat finer but close on cheeks below, finer and quite sparse on lateral areas of face below, somewhat closer on supraclypeal area, finer and irregular on shining clypeus; scutum quite coarsely and closely rugoso-punctate, punctures somewhat more distinct across median area of disc, finer and densely crowded on black areas of scutellum, more coarse and distinct on each side, coarse and deep but slightly separated on pleura below, becoming quite densely crowded above; lateral faces of propodeum rather dull, shallowly and rather finely and irregularly punctate, posterior face quite closely and shallowly punctate, triangle entirely impunctate, rather smooth but quite densely tessellate; basal abdominal tergum shining, minutely but quite closely punctate toward base, punctures toward apical margin deeper, more distinct and quite close; discs of terga 2-5 deeply, distinctly, rather finely and closely punctate, punctures becoming somewhat more sparse and minute toward the narrowly impunctate apical rims; pseudopygidium transverse, forming the truncate apical margin of tergum 5, rather extensive, deeply covered with pale yellowish tomentum; pubescence extremely short, thin and obscure, hardly evident, entirely pale where visible.

MALE—Length 7.5-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly more than half width of eyes; shorter side of segment 1 of flagellum slightly longer than segment 2, median segments considerably broader than long; mandibles slender and simple; wings rather lightly infuscated basally, becoming quite deeply so apically, with the usual three submarginal cells, 2nd very broad anteriorly, 3rd much narrowed, veins testaceous to piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae shining, with only a very few, minute, scattered punctures; posterior margin of scutellum quite deeply impressed medially; front coxal spines elongate and slender, somewhat obscured by pubescence; hind femora unmodified; face, including labrum and mandibles except tips, almost entirely yellow below level of antennae, only upper half of supraclypeal area black, and with some black in lateral clypeal sutures, the yellow face marks ending triangularly on eye margin near top of eyes (fig. 100); scape of antennae bright yellow anteriorly, and cheek narrowly yellow on posterior margin of eye above; pronotal collar, tubercles, tegulae, scutellum except in mid-line, adjacent area of metanotum, a maculation on each side of posterior face of propodeum, and a large transverse maculation on pleura, bright yellow; legs testaceous basally, tibiae yellow in part, and basitarsi bright yellow, the more apical tarsal segments more testaceous, spurs pale yellow; abdominal terga 1-6 with transverse, subapical, bright yellow bands which are more or less narrowed medially, sometimes narrowly interrupted, quite broad laterally; abdominal sterna entirely black; punctures coarse, deep, distinct and somewhat separated over most of face, somewhat more sparse on each side below antennae, somewhat finer and closer but still distinctly separated

on clypeus, much finer and quite close on cheeks; scutum coarsely rugoso-punctate, with only a few shining interspaces evident near central portion of disc, the maculated areas of scutellum coarsely and distinctly punctate, blackened mid-line and anterior margin densely and finely rugose; pleura with coarse, deep, distinct and slightly separated punctures in large part, these becoming considerably closer above adjacent to tubercles; lateral faces of propodeum rather dull, very finely, shallowly and rather irregularly punctate, punctures of posterior face somewhat deeper and more distinct but quite close, triangle impunctate but dull and tessellate; tergum 1 shining and very minutely punctate basally, punctures becoming more distinct in the yellow transverse band and beyond; terga 2-6 with deep, distinct, close and rather fine, uniformly distributed punctures, these becoming somewhat sparser and finer to the narrow impunctate rims; pubescence extremely short, thin and obscure, hardly evident in general, entirely pale where visible; pygidial plate somewhat broader at base than the median length, quite strongly narrowed apically, apex deeply incised, lateral margins carinate, surface rather dull, quite closely but shallowly punctate; sternum 8 with a median, apical projection which is slightly narrowed apically, setose toward the tip, the apical setae elongate; gonocoxites of genital armature (fig. 101) not setose beneath, base with a broad, subtruncate lobe, gonostyli tufted apically.

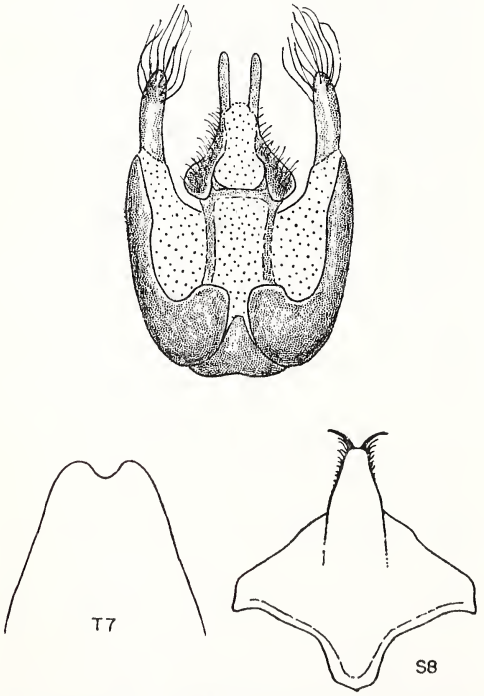


Figure 101
Tergum 7, sternum 8 and genital armature in male of *Nomada modesta*.

DISTRIBUTION—New York to Alabama, June to September.

FLOWER RECORDS — *Cephalanthus, Cucurbita, Helenium, Rhus* and *Solidago*.

Nomada (Micronomada) texana Cresson

Nomada texana Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 271. ♀ ♂.

Cephen texanus Robertson, 1903. Canad. Ent. 35, p. 176. ♀ ♂.

Cephen texanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks very narrow, less than half width of eyes; shorter side of basal segment of flagellum fully as long as segment 2, median segments about as long as broad; mandibles slender and simple; wings subhyaline basally, becoming rather deeply infuscated at apex and in region of marginal cell, 2nd submarginal very broad anteriorly, 3rd much narrower, veins piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae shining between minute and quite sparse punctures; posterior margin of scutellum slightly grooved medially; front coxal spines slender and elongate, rather densely pubescent; apex of hind tibiae with a row of short, yellowish, apically dilated setae; head including clypeus, largely black, face with broad, extensive, yellow maculations filling space between antennae, supraclypeal area and eye, extending from clypeus nearly to top of eye, and a narrow yellow band bordering margin of eye on cheeks above; mandibles yellow at base, becoming more testaceous medially, fuscous at tip, labrum entirely testaceous; scape, pedicel and base of flagellum testaceous, the more apical flagellar segments more brownish; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, and a rather broad, transverse stripe on pleura, bright yellow; scutellum with a black median line and anterior margin narrowly black; legs testaceous in large part, spurs pale yellow, and hind tibiae with a small yellow apical maculation; abdominal terga 1-5 with entire, transverse, subapical, yellow bands, those on 2 and 3 much narrowed medially but very broad laterally, band on 4 less restricted medially, and that on 5 quite deeply constricted; abdominal sterna 1 and 2 entirely

dark, 3 and 4 with conspicuous, transverse, yellow bands; punctures of face above coarse, close, deep and distinct, becoming more sparse laterally and below, quite close but somewhat finer on supraclypeal area, very irregular and scattered on the shining clypeus, rather fine and close on vertex and on cheeks above, becoming coarser and deeper on cheeks below; scutum and scutellum coarsely rugoso-punctate, punctures very coarse and slightly separated on pleura below, becoming somewhat finer and crowded above, finer but deep and distinct on metapleura; lateral faces of propodeum densely rugose in part, but with a shining, punctate space below, the punctures rather sparse, posterior face quite deeply, closely and distinctly punctate, triangle impunctate, somewhat shining; basal addominal tergum shining, punctures toward base exceedingly minute and rather close, becoming somewhat deeper, more distinct and more widely separated in the yellow band, minute and scattered toward the rim; terga 2-5 very uniformly, closely, deeply and finely punctate, punctures becoming somewhat finer toward the narrowly impunctate rims; pseudopygidium rather extensive, median length about half the breadth, narrowly truncate apically, covered with short, dense, yellowish tomentum; pubescence extremely short, thin and obscure, entirely pale where visible.

MALE—Length 7-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments slightly broader than long; mandibles slender and simple; wings subhyaline at base, becoming quite deeply infuscated apically, with the usual three submarginal cells, 2nd broad anteriorly, 3rd quite strongly narrowed, veins piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae shining between minute, sparse punctures; posterior margin of scutellum slightly grooved medially; front coxal spines slender and elongate, rather densely pubescent; hind femora unmodified; lower half of face, including labrum and basal half of mandibles, largely yellow, upper half of supraclypeal area black, the lateral yellow maculae terminating acutely at upper end of eye, cheeks with a narrow yellow maculation bordering eye above; antennal scape bright yellow anteriorly, the flagellum brownish-testaceous below, becoming more piceous above; pronotal collar, tubercles, tegulae, scutellum except anterior margin and mid-line, adjacent median area of metanotum, and a transverse band on pleura bright yellow; legs largely testaceous, spurs pale yellow, mid and hind tibiae with yellow apical maculations, and hind basitarsi yellow in part; punctures of face above coarse, deep and distinct, only slightly separated, becoming somewhat less coarse and more widely separated below, irregular and variable as to size on clypeus, somewhat finer and close on vertex and cheeks above, becoming slightly coarser below; scutum and scutellum quite coarsely rugoso-punctate, punctures of pleura below very coarse, deep and slightly separated, becoming quite densely crowded above; propodeum laterally dull, with variable, very fine and shallow punctures, posterior face with somewhat closer and deeper punctures, triangle entirely impunctate, somewhat shining; basal abdominal tergum shining, punctures minute and quite close toward base, becoming somewhat more coarse and sparse on the transverse yellow band; terga 2-6 with uniformly close, deep and rather coarse punctures throughout, these becoming somewhat finer toward the narrowly impunctate rims, these somewhat reddened on the more apical terga; pubescence very short, thin and obscure, entirely white where visible; basal width of pygidial plate about equal to median length, slightly narrowed apically, apex slightly incised or emarginate, margins carinate, surface minutely and closely punctate basally, punctures becoming obscure apically; sternum 8 as in *modesta* (fig. 101); gonocoxites of genital armature similar to those of *heiligbrodtii* (fig. 99), the gonostyli very short.

DISTRIBUTION—Michigan to Massachusetts, south to Texas and Alabama, July to September.

FLOWER RECORDS—*Helianthus, Marilaundium* and *Verbesina*. This species has been recorded by Robertson (1929) on *Cephalanthus, Eryngium, Pycnanthemum* and *Verbena*.

Nomada (Micronomada) wisconsinensis Graenicher

Nomada wisconsinensis Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1, p. 239.

FEMALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly less than half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments very slightly longer than broad; mandibles slender and simple; wings lightly infuscated, somewhat more deeply so apically, with the usual three submarginal cells, 2nd submarginal very broad anteriorly, anterior width of the 3rd about half that of 2nd, veins brownish-testaceous, stigma testaceous, basal vein interstitial with transverse median; tegulae shining between sparse and minute punctures;

posterior margin of scutellum quite deeply grooved medially; front coxal spines slender and elongate, quite densely pubescent; apex of hind tibiae densely covered by a transverse patch of very short, reddish setae; head largely black, clypeus somewhat tinged with testaceous, labrum quite strongly so, mandibles yellow at base, face with rather restricted, lateral, yellow maculae reaching from upper angle of clypeus nearly to top of eye, cheeks with a very faint yellowish spot near upper end of eye; scape, pedicel and base of flagellum yellowish-testaceous, flagellum more brownish below, piceous above; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, and a posterior median spot on pleura, bright yellow; the depressed median line of scutellum dark reddish, anterior margin narrowly black; legs largely testaceous, spurs pale yellow, hind tibiae with a rather indefinite, apical, yellow maculation; abdominal terga 1-5 with transverse yellow bands, that on tergum 1 very narrow, broad laterally on 2 but quite strongly narrowed medially, narrow and widely interrupted medially on 3, entire on 4 and 5; abdominal sterna entirely black; punctures very coarse, deep and distinct over entire face, close above antennae and on supraclypeal area, somewhat more widely separated laterally, somewhat finer and slightly separated on clypeus, close and quite coarse over most of vertex and cheeks; scutum and scutellum coarsely rugoso-punctate, pleural punctures very coarse and deep, slightly separated below, becoming quite densely crowded and somewhat finer above; propodeum laterally dull, densely and very finely rugoso-punctate, almost tessellate; posterior face with quite coarse, deep, distinct and close punctures, triangle dull and impunctate; basal abdominal tergum shining, minutely and obscurely punctate toward base, punctures becoming more distinct and sparse just beyond the transverse band, but margin becoming impunctate; terga 2-5 quite uniformly closely, deeply, distinctly and rather coarsely punctate, rims becoming narrowly impunctate, these somewhat broader and more reddish on the more apical terga; pseudopygidium quite broad, transverse, median length about one third the breadth, densely covered with short, yellowish, subappressed hairs or tomentum; pubescence very fine, thin and obscure, entirely pale where at all visible.

MALE—Length 8-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks about half width of eyes; shorter side of basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles slender and simple; wings subhyaline basally, becoming quite deeply infuscated apically, with the usual three submarginal cells, anterior margin of 2nd about twice as broad as 3rd, veins testaceous to piceous, stigma testaceous, basal vein interstitial with transverse median; tegulae shining between quite sparse and minute punctures; posterior margin of scutellum quite deeply grooved medially; front coxal spines slender and elongate, densely pubescent; hind femora unmodified; lower part of face largely yellow, but supraclypeal area usually entirely black, and clypeal sutures lined with black, lateral maculations ending narrowly near top of eye, and cheeks with a narrow yellow maculation on eye margin above; mandibles yellow basally, labrum more testaceous, scape yellowish anteriorly, flagellum brownish-testaceous beneath, more piceous above; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, a large posterior spot on pleura, and a smaller more anterior spot, bright yellow; scutellum reddened in the median groove, anterior margin black; legs largely testaceous, tibiae more or less yellowish apically, spurs pale yellow; abdominal terga 1-5 with entire, transverse, subapical, yellow bands, that on 1 very narrow, very broad on 2, but somewhat narrowed medially, strongly narrowed medially on 3 and and 4, becoming broad laterally, and less narrowed on 5, tergum 6 with a pair of lateral, yellow maculations which are not connected; abdominal sterna entirely black; punctures of face coarse, deep and distinct, rather close in general, somewhat variable as to size on clypeus, deep, distinct and close over most of cheeks and vertex; scutum and scutellum very coarsely rugoso-punctate, the punctures on pleura below somewhat separated, very coarse and deep, becoming closely crowded and somewhat less coarse above; propodeum laterally dull, densely and very finely rugose, posterior face more distinctly but still very closely punctate, triangle impunctate, rather dull; basal abdominal terga shining, the more basal punctures very minute and indistinct, becoming somewhat more coarse, sparse and distinct in region of transverse yellow band, and narrowly impunctate along rim; terga 2-6 with quite uniformly deep, distinct, close and rather coarse punctures, rims becoming narrowly impunctate, these somewhat reddish on the more apical terga; pubescence extremely short, sparse and obscure, hardly evident, entirely whitish where visible; pygidial plate strongly narrowed apically, tip deeply emarginate, basal width about equal to median length, lateral margins distinctly carinate, surface rather dull, with numerous shallow and vague punctures basally, these becoming inevident apically; sternum 8 as in *modesta* (fig. 101); gonocoxites of genital armature similar to those in *heiligbrodtii* (fig. 99), the gonostyli very short.

DISTRIBUTION—Wisconsin and Michigan, June and July.

Nomada (Holonomada) affabilis affabilis Cresson

(Fig. 102)

Nomada affabilis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 74. ♂.

Nomada affabilis Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 123. ♀ ♂.

Holonomada affabilis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9.5-12 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin not carinate; basal segment of flagellum fully equal to segment 2 in length, median segments considerably longer than broad; mandibles robust, entirely simple; wings lightly infuscated, somewhat more deeply so apically and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd veins and stigma testaceous, basal vein much basad of transverse median; tegulae uniformly finely and closely punctate; scutellum posteriorly deeply grooved medially; front coxae not spined; apex of hind tibiae with a row of short testaceous bristles; face, including labrum and mandibles, largely yellow; vertex, posterior half of cheeks, and median portion of face above antennae and around ocelli, black, with a small yellow maculation just below anterior ocellus, the eyes completely surrounded with yellow, becoming somewhat ferruginous along upper inner margin, scape yellow anteriorly, flagellum brownish beneath toward base, becoming brownish-piceous apically, blackish above; pronotal collar, tubercles, tegulae, scutellum and axillae, metanotum, mesopleura in large part, lateral margins and a pair of submedian narrow lines on scutum, and posterior face of propodeum in large part, bright yellow, otherwise the scutum, propodeal triangle, metapleura and adjacent half of lateral faces of propodeum, and ventral surface of mesothorax, black; lower margin of mesopleural maculation ferruginous; femora brownish-ferruginous in large part, becoming yellow at apex, the tibiae brownish-ferruginous, with basal and apical yellow maculations, basitarsi more yellowish, the more apical tarsal segments becoming more reddish, spurs pale yellow; abdominal terga 1-5 with broad, entire, bright yellow bands, these occupying most of the discs of 2-5, only the apical impressed areas dark or ferruginous, band on basal tergum submedian, with basal and apical areas piceous; abdominal sterna yellow in large part, apical margins becoming more or less ferruginous; face above antennae and vertex quite coarsely rugoso-punctate, cheeks somewhat more finely so, punctures becoming more distinct but still close on face below antennae laterally, supraclypeal area and clypeus very minutely, shallowly and obscurely punctate; scutum, scutellum and mesopleura quite coarsely rugoso-punctate; metapleura somewhat more shallowly rugose and lateral faces of propodeum much more finely and shallowly rugose, posterior face shallowly rugose in maculated area, the triangle impunctate, rather irregularly rugoso-striate toward upper margin; abdominal terga very minutely and closely punctate throughout, apical margins becoming very narrowly impunctate; pseudopygidium transverse, forming the rather broad, apical margin of tergum 5, median length about one-third the breadth, densely covered with short silvery tomentum; pubescence very short, thin and sparse, somewhat yellowish over most of head and on thorax laterally, very obscure on dorsum of thorax, hardly evident on abdomen except toward apex beneath, sternum 5 with much elongate yellowish pubescence at each side apically.

MALE—Length 10-12 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, not definitely carinate posteriorly; antennal scape slightly swollen, apex deeply excavated and largely covering the pedicel, basal segment of flagellum fully equal to segment 2 in length, median segments only slightly longer than broad; mandibles robust, entirely simple; wings subhyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining between close, fine, deep and distinct punctures; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; hind femora not modified; face below antennae entirely yellow, lateral maculations ending narrowly on eye margins slightly above antennae; face above, vertex and cheeks largely black, a small yellow maculation at top of each eye and posterior margin bordered with yellow nearly to top; antennal scape bright yellow anteriorly, flagellum more brownish-testaceous below, piceous above; pronotal collar, tubercles, tegulae, scutellum, axillae, median area of metanotum just below scutellum, a pair of large propodeal maculations, and a transverse band on pleura above, all bright yellow; thorax otherwise black, the coxae and front and mid trochanters yellow in part, femora mostly testaceous, tibiae testaceous becoming yellow basally and apically,

and tarsi testaceous in large part, spurs pale yellow; abdominal terga 1-6 with broad, entire, transverse, yellow bands, these slightly narrowed medially on 1 and 2, somewhat less so on 3 and 4, uniform in width on 5 and 6, basal and apical areas black to piceous; abdominal sterna largely yellow, becoming ferruginous apically, the pygidium ferruginous; cheeks, vertex and upper part of face quite coarsely rugoso-punctate, becoming more finely so below level of antennae, clypeus becoming very finely and closely punctate toward the narrow, impunctate, apical margin, malar space and adjacent lower end of face on each side shining and nearly impunctate; scutum and mesopleura densely and coarsely rugoso-punctate, scutellum with more distinct, coarse and deep punctures, metapleura rather shallowly and closely punctate, lateral faces of propodeum somewhat smoother, surface irregularly and rather finely subrugose, posterior face shallowly rugoso-punctate in maculated areas, triangle entirely black, smooth and impunctate, but rather densely tessellate and dull, becoming somewhat striate above; abdominal terga quite uniformly, minutely and very closely punctate throughout, punctures becoming minute and sparse toward the extreme base, somewhat coarser and more distinct toward apical margins of the more apical terga; pubescence short, entirely pale, erect, rather copious over head and thorax but not hiding surface except to some degree beneath, hardly evident on abdomen dorsally, but sternal plates more or less densely fringed with elongate yellowish hairs; sternum 6 quite densely covered with elongate, erect, somewhat recurved hairs over apical third; basal width of pygidial plate (fig. 102) about equal to median length, slightly narrowed and broadly rounded apically, not emarginate, margins carnate, surface very deeply, closely and rather finely punctate; sternum 8 with a slender, elongate, apical process which is conspicuously fringed apically and at base; gonocoxites of genital armature (fig. 102) broad at base, inner margin lobate medially, gonostyli much shorter than penis valves, compressed, densely tufted, with a basal protuberance beneath which is densely tufted.

DISTRIBUTION—Illinois to Massachusetts, south to Florida, March to June.

FLOWER RECORDS—*Brassica, Oenothera, Rubus* and *Viola.* Robertson (1929) records this species on the following: *Apocymum, Aruncus, Brauneria, Camassia, Cercis, Claytonia, Cornus, Diospyros, Gillenia, Houstonia, Hydrophyllum, Krigia, Malva, Melilotus, Pentstemon, Polemonium, Taenidia, Trifolium, Verbena* and *Zizia.*

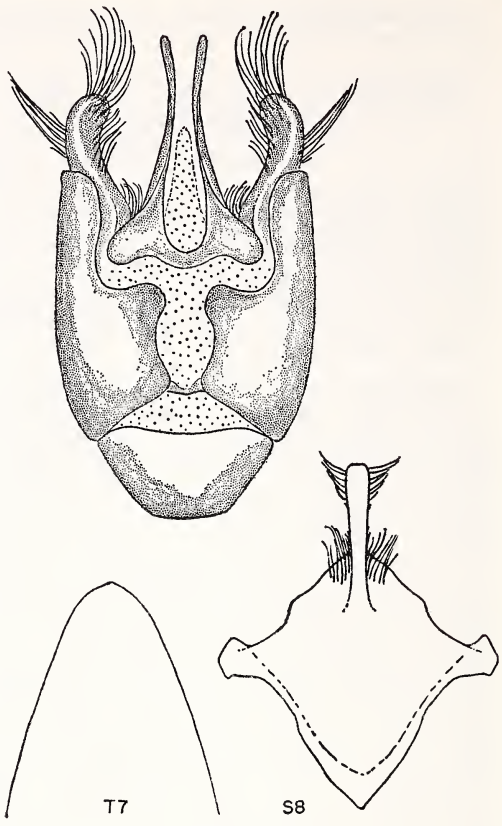


Figure 102
Tergum 7, sternum 8 and genital armature in male of *Nomada affabilis.*

This subspecific designation of *affabilis* results from the recognition of another form, *dallasensis* Cockerell, in Texas.

Nomada (Holonomada) superba superba Cresson

Nomada superba Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 281. ♂.

Nomada superba Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 340. ♀ ♂.

Holonomada superba Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-12 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks nearly equal to eyes in width, posterior margin subcarinate; basal segment of flagellum fully equal to eyes in width, posterior margin subcarinate; basal segment of flagellum fully equal to segment 2, median segments only slightly longer than broad; mandibles robust, simple; wings lightly

infuscated, somewhat more deeply so apically, with the usual three submarginal cells, 2nd and 3rd subequal and rather narrow anteriorly, veins piceous, basal vein considerably basad of transverse median; tegulae shining between very fine punctures, these rather close anteriorly and along inner margin, becoming quite sparse on the outer and posterior margins; posterior margin of scutellum rather deeply depressed medially; front coxae not spined; apex of hind tibiae with a row of short and rather fine yellowish setae; face largely yellow below level of antennae, upper half of supraclypeal area black, lateral yellow areas ending narrowly at upper end of eye, upper part of face, vertex and most of cheeks black, cheeks with a narrow yellow band along posterior margin of eye nearly to top; antennal scape yellow anteriorly, flagellum brownish-testaceous beneath, somewhat more piceous above; pronotal collar, tubercles, tegulae, scutellum except anterior margin, a small median spot on metanotum, and a small anterior maculation on pleura, bright yellow, the pleural maculations becoming ferruginous above; femora largely testaceous, tibiae, tarsi and spurs yellow; abdominal terga 1-5 with broad, transverse, entire, yellow bands, those on 2 and 3 slightly narrowed medially, basal and apical areas piceous or dull reddish; abdominal sterna largely red, becoming somewhat yellowish in part; face above antennae, vertex and cheeks coarsely and deeply rugoso-punctate, the lateral punctures below somewhat more distinct and separated, becoming quite sparse on malar space, clypeus and supraclypeal area with very minute, densely crowded punctures; scutum and mesopleura densely and rather coarsely rugoso-punctate, scutellum with coarse, deep and more distinct punctures, metapleura somewhat more finely rugose, the lateral and posterior faces of propodeum quite coarsely and regularly rugose, triangle impunctate but densely tessellate, becoming irregularly striate along upper margin; abdominal terga minutely and very closely punctate throughout, but the more basal punctures of basal tergum becoming hardly visible, the more apical punctures on the more apical terga becoming somewhat coarser and more definitely separated, apical rims narrowly impunctate; pseudopygidium transverse, forming the truncate apical margin of tergum 5, median length somewhat more than one-third the breadth, densely covered with short silvery tomentum; pubescence very short and thin, rather copious over head and thorax, entirely pale, hardly visible on abdomen dorsally, the sterna more evidently pubescent, sternum 5 with a dense tuft of elongate hairs on each side of mid-line apically.

MALE—Length 11-12 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks fully equal to eyes in width, not noticeably carinate posteriorly; antennal scape slightly swollen, apex deeply excavated and largely enclosing the pedicel, basal segment of flagellum fully equal to segment 2, median segments about as broad as long; mandibles robust and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, veins testaceous to brownish, 2nd and 3rd submarginal cells subequal and rather narrow anteriorly, basal vein usually somewhat basad of transverse median; tegulae shining, punctures minute and rather indistinct, close along inner margin, becoming rather sparse laterally and posteriorly; posterior margin of scutellum slightly impressed medially; front coxae not spined; hind femora not modified; face entirely yellow below level of antennae, scape bright yellow, upper part of face, vertex and cheeks entirely black; pronotal collar, tubercles, tegulae, a pair of small maculations on scutellum, and a very small yellow spot on pleura anteriorly, bright yellow; thorax otherwise entirely black, with femora largely testaceous, tibiae and tarsi bright yellow, spurs pale yellow; abdominal terga 1-6 with broad, entire, bright yellow bands, these slightly narrowed on 2 and 3, basal and apical areas blackish, to some degree red apically on the more apical terga; abdominal sterna more or less reddish, with transverse, sub-basal, yellow areas, sternum 6 almost entirely yellow; punctures of face above antennae, on vertex and on cheeks coarse, deep and close, somewhat more distinct on face laterally and below, impunctate on malar space and adjacent area, supraclypeal area and clypeus with minute, densely crowded and obscure punctures; scutum, scutellum and mesopleura densely rugoso-punctate, somewhat more finely so on each side of scutum, metapleura more shallowly rugoso-punctate, propodeum quite coarsely rugose or reticulate, triangle impunctate but dull and densely tessellate, becoming irregularly rugose or striate along upper margin; abdominal terga with minute and very close punctures throughout, these becoming hardly visible on tergum 1 basally, becoming somewhat coarser and more widely separated apically on the more apical terga; pubescence entirely pale, rather copious and erect over most of head and thorax, hardly evident on abdomen dorsally, but with considerable fine, elongate, suberect pubescence ventrally, sternum 6 largely covered with rather elongate and erect, white pubescence; basal width of pygidial plate about equal to median length, quite strongly narrowed apically, apex narrowly rounded, not at all emarginate, margins carinate, surface quite closely and rather finely punctate, punctures becoming obscure api-

cally; sternum 8 and genital armature much as in *affabilis* (fig. 102).

DISTRIBUTION—Kansas and Minnesota, east to Ohio and Georgia, April to July.

FLOWER RECORDS—Robertson (1929) has recorded *superba* on the following plant genera: *Brauneria, Camassia, Cardamine, Comandra, Coreopsis, Cornus, Erigeron, Fragaria, Geranium, Heracleum, Houstonia, Krigia, Lithospermum, Melilotus, Nepeta, Nothoscordum, Oxalis, Phlox, Prunus, Ranunculus, Rubus, Salix, Senecio, Sisyrinchium, Stachys, Stellaria, Trifolium* and *Zizia*.

Another form of this species, *malvastri* Swenk, from Nebraska makes this subspecific designation of *superba* necessary.

Nomada (Centrias) erigeronis Robertson

(Figs. 103 & 104)

Nomada erigeronis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 341. ♀.

Centrias erigeronis Robertson, 1903. Canad. Ent. 35, p. 176. ♀ ♂.

Centrias erigerontis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks more than half width of eyes, hind margin strongly carinate; longer side of basal segment of flagellum equal to segment 2, median segments about as broad as long; mandibles slender and simple; wings lightly infuscated basally, becoming rather deeply infuscated apically, with the usual three submarginal cells, 2nd submarginal about as broad anteriorly as posteriorly, 3rd strongly narrowed, veins piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae deeply, closely and quite coarsely punctate; pronotal collar sharply carinate; posterior margin of scutellum quite deeply grooved medially; front coxal spines slender and elongate, quite densely pubescent; apex of hind tibiae with 5 or 6 elongate, yellowish bristles; lower half of face, including labrum and mandibles, and antennae basally, reddish-testaceous, lateral face marks produced narrowly along inner margin of eye nearly to vertex, and orbital margin of cheeks narrowly yellowish, the narrow malar space and area between clypeus laterally and lower end of eye bright yellow; median area of face above, vertex and cheeks, black; antennal flagellum beyond segment 1 brownish beneath, somewhat darker above; pronotal collar, the small axillae on each side of scutellum, and small spots on metanotum, bright yellow; tubercles, tegulae and legs in large part, more testaceous, spurs pale yellow; scutellum bright ferruginous, pleura suffused with ferruginous anteriorly and to some degree above and posteriorly, and scutum narrowly rimmed with dull ferruginous on each side; abdominal terga with bright yellow maculae, those on basal tergum small, submedian and rather widely interrupted medially; tergum 2 with a broad, extensive maculation on each side occupying most of disc, but deeply constricted, almost interrupted medially; tergum 3 with a narrower, transverse band which is broadly interrupted medially, 4 with a rather narrow, entire, subapical band; and tergum 5 with a rather extensive, median, apical, more whitish area and a small spot on each side, abdominal sterna entirely black; punctures of face above antennae and on vertex coarse, close and deep, becoming somewhat finer and very close on cheeks below and on face laterally, the clypeus quite closely, deeply, distinctly and rather finely punctate; scutum and scutellum very coarsely and deeply rugoso-punctate, the pleura below somewhat more deeply and distinctly but very closely punctate becoming somewhat finer but still very close and deep above; propodeum laterally somewhat shining, but with fine, scattered and irregular, shallow punctures, posterior face much more closely punctate and dull, triangle impunctate but rather dull and tessellate; the more basal abdominal terga with deep, distinct, close, rather coarse and uniform punctures, those on 1 becoming more minute and sparse toward base; punctures on the more apical terga somewhat finer and closer but still distinct and deep; pseudopygidium transverse, very short and rather narrow, forming the narrow apical rim of tergum 5, densely covered with very fine, silvery, subappressed tomentum; pubescence extremely short, thin and obscure, entirely whitish where visible.

MALE—Length 10-11 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks very nearly as broad as eyes, posterior margin carinate; antennal scape much swollen, apex deeply excavated and completely hiding pedicel, basal segment of flagellum about half length of segment 2, the more apical segments much shorter, only slightly longer than broad, segment 3 with a minute but distinct spine beneath, apical segment somewhat more elongate and acuminate; mandibles slender and simple apically; wings subhyaline at base, becoming rather deeply infuscated apically, with the usual three submarginal cells, the 2nd nearly as broad anteriorly as posteriorly, 3rd much narrower, veins piceous, stigma somewhat more testa-

ceous, basal vein interstitial with transverse median; tegulae coarsely, closely and deeply punctate throughout; pronotal collar sharply carinate; posterior margin of scutellum rather shallowly grooved medially; front coxal spines rather short, obscured by quite dense pubescence; lower surface of hind femora rather strongly carinate along the posterior margin; apex of hind tibiae with four rather fine and obscure, elongate, yellowish bristles; entire face below antennae, including labrum and basal half of mandibles, bright yellow; face above antennae, vertex and cheeks, entirely black, the lateral facial maculae ending obliquely on eye margin near top of eye; antennal scape and segment 1 of flagellum yellow, flagellum otherwise reddish-testaceous below, more piceous above; pronotal collar, tubercles, tegulae, axillae, metanotum except in center, and rather large anterior maculations of pleura, bright yellow; scutellum bright ferruginous, legs largely reddish-testaceous, but front legs chiefly yellow anteriorly, and mid and hind legs with yellow maculations on trochanters, femora and tibiae, spurs pale yellow; abdominal terga with transverse bright yellow maculations, that on tergum 1 subapical, and rather widely interrupted medially, that on 2 broad laterally, deeply constricted medially, with only a narrow connecting band; bands entire on 3-5 but somewhat narrowed near mid-line, very small and median on 6; punctures of face above antennae, on vertex and on cheeks above, very coarse, deep and close, becoming somewhat finer but very close and deep on cheeks below, very fine over most of face below antennae and on clypeus; scutum and scutellum coarsely and deeply rugosopunctate, punctures very coarse and close over entire pleura, becoming almost rugose above; propodeum laterally with rather fine, shallow and irregular punctures, becoming close posteriorly, very close on posterior face, the triangle impunctate but densely tessellate, becoming almost striate along upper margin; punctures of abdominal terga deep, distinct, quite coarse and uniformly close, only the narrow apical rims impunctate, but tergum 1 becoming more minutely and sparsely punctate toward base; abdominal sterna very coarsely, deeply and closely punctate, becoming more finely so on the more apical sterna, apical margins of 4 and 5 somewhat incurved and broadly depressed, covered with dense, fine and elongate, plumose pubescence, hiding the surface, and sternum 6 with a dense fringe of elongate, more erect, pale hairs; pubescence very short, thin, suberect, but rather inconspicuous, entirely pale; basal width of pygidial plate nearly equal to median length, strongly narrowed apically, apex narrowly rounded, tip only very faintly incised if at all, margin carinate, surface closely, quite coarsely, and deeply punctate; sternum 8 (fig. 104) broadly produced apically, this part subtriangular, fringed with robust, ventrally projecting setae; gonocoxites of genital armature (fig. 103) not lobate at base, the gonostyli not produced and setose at base beneath, rather slender, tufted apically and along the inner margin.

DISTRIBUTION—Kansas and Nebraska to Massachusetts, in May.

FLOWER RECORDS—Recorded by Robertson (1929) on *Coreopsis* and *Erigeron*.

Nomada (Nomadula) articulata Smith

?Nomada americana Kirby, 1837. Fauna Bor.-Amer., p. 269. ♀.

Nomada articulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 248. ♂.

Nomada incerta Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 309. ♀. New synonymy.

Nomada (Centrias) americana dacotana Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 592. ♂.

Nomada americana Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 310.

Nomada (Nomada) bilobata Swenk, 1913. Nebr. Univ. Studies 12, p. 25. ♀. New synonymy

Centrias americanus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8.5 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks slightly more than half width of eyes, hind margin strongly carinate; longer side of basal segment of flagellum equal to segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming quite strongly infuscated on apical margin and in marginal cell, with the usual three submarginal cells, 2nd usually not much broader anteriorly than 3rd, veins piceous, stigma somewhat more testaceous, basal vein interstitial or nearly with transverse median; tegulae deeply, distinctly, rather coarsely and closely punctate; posterior margin of scutellum very slightly impressed medially; front coxal spines well developed but quite densely pubescent and obscure; apex of hind tibiae with a row of 4 or 5 very short bristles which do not project beyond the finer whitish pubescence beneath; head and thorax chiefly red, flagellum somewhat more brownish beneath, piceous above, head with some black above antennae, around ocelli and on posterior margin of cheeks, prothorax laterally and beneath, and

front coxae in part, black; pleura below, metapleura, mid coxae and propodeum, in large part black, and scutum with a rather faint median longitudinal black line; legs testaceous to ferruginous, spurs pale yellow; abdomen chiefly red, impressed apical margins of the more apical terga becoming yellowish-hyaline; punctures of face above antennae and on vertex and cheeks close, deep, distinct and quite coarse, becoming very fine and close on supraclypeal area and clypeus, relatively coarse and slightly separated on each side of face below antennae; scutum very coarsely rugoso-punctate, scutellum somewhat more finely so, pleura below coarsely and very closely punctate, but with some narrow, shining interspaces evident, becoming quite densely rugoso-punctate above; lateral faces of propodeum finely rugose in part but with some smooth, somewhat shining spaces, posterior face quite densely and finely rugoso-punctate, triangle impunctate but dull, upper margin obscurely striate on each side; abdominal terga quite deeply, rather finely and closely punctate, more finely so on basal tergum which becomes more minutely and sparsely punctate toward base, apical rims of the terga narrowly impunctate; tergum 5 quite finely and closely punctate across basal margin, becoming somewhat more coarsely and sparsely punctate toward apex; pseudopygidium transverse, very short, forming the rather narrow apex of tergum 5, densely covered with suberect, very fine, silvery tomentum; pubescence very short and thin, erect in large part, entirely white or pale yellow where evident.

MALE—Length 8.5-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly subequal to eyes in width, not noticeably carinate posteriorly; antennal scape strongly swollen, apex deeply excavated and completely hiding pedicel, longer side of basal segment of flagellum shorter than segment 2, the more apical segments shorter, not much longer than broad, segment 3 with a minute but distinct ventral spine, apical segment somewhat elongated and acuminate; mandibles slender and simple; wings subhyaline basally, becoming lightly infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd usually not much broader anteriorly than 3rd, veins piceous, stigma somewhat more reddish, basal vein slightly basad of transverse median, or in some specimens interstitial with it; tegulae closely, deeply and rather coarsely punctate throughout; posterior margin of scutellum very slightly impressed medially; front coxal spines well developed, but quite densely pubescent and obscure; lower margin of hind femora flattened or concave, with distinct anterior and posterior subcarinate margins; entire face below antennae, except for tips of mandibles and scape anteriorly, bright yellow; face above, vertex and cheeks black; antennal flagellum yellowish-testaceous beneath, piceous to black above; pronotal collar narrowly yellow along the carinate margin, tubercles testaceous, tegulae more reddish testaceous, pleura usually with a small, anterior, yellow maculation and metanotum with a pair of sublateral yellow spots, the scutellum red and scutum with red infusions; front and mid legs largely testaceous, front tibiae yellow apically, hind legs more ferruginous, spurs pale yellow; punctures of face above antennae, on vertex and cheeks coarse, close, deep, and distinct, becoming somewhat finer on cheeks below, very fine, shallow and obscure on maculated areas below antennae; scutum and scutellum densely and rather coarsely rugoso-punctate, scutellum somewhat more finely so, pleura quite coarsely rugoso-punctate in general, lower surface somewhat obscured with whitish tomentum; lateral faces of propodeum rather dull, with very shallow but quite close punctures, posterior face finely and closely punctate beneath, with rather copious pale pubescence, triangle impunctate, becoming rather finely substriate along upper margin; abdominal terga with conspicuous yellow maculations, widely interrupted on 1 and 2, the resulting lateral marks on 1 transverse and rather narrow, those on 2 broad laterally, becoming strongly narrowed toward mid-line, those on 3-6 entire, strongly narrowed medially on 3, basal area of 2 and 3 ferruginous, and tergum 1 ferruginous medially and in vicinity of maculation, terga otherwise blackish, tip of abdomen more ferruginous; punctures of abdominal terga deep, distinct, very close and rather coarse in general, finer on tergum 1 basally, only the very narrow apical rims impunctate, that on 5 somewhat broader and more ferruginous in color; abdominal sterna largely ferruginous, apical margins rather broadly yellowish-hyaline, punctures deep, distinct and rather close; pubescence entirely pale, short, quite copious in general, more whitish laterally and beneath, more yellowish above, hardly evident on abdomen dorsally, but rather dense beneath, especially on the more apical sterna, forming a quite dense subapical fringe of elongate yellowish hairs on 5, sternum 6 with rather dense tufts of elongate yellowish hairs at each side; pygidial plate about as broad at base as median length, strongly narrowed apically, tip very slightly incised, surface quite closely and rather deeply punctate, the punctures becoming minute and obscure apically; sternum 8 and genital armature similar to those in *rubicunda* (figs. 103 & 104).

DISTRIBUTION—North Dakota to the

New England States, south to Louisiana and Florida, April to August.

FLOWER RECORDS—*Apocynum, Erigeron, Hypochaeris, Melilotus, Ranunculus* and *Senecio*. This species has been recorded by Robertson on the following additional genera: *Amorpha, Aruncus, Camassia, Ceanothus, Chrysanthemum, Coreopsis, Crataegus, Dianthera, Geranium, Houstonia, Krigia, Malva, Nepta, Nothoscordum, Oxalis, Potentilla, Rubus, Rudbeckia, Taenidia, Trifolium* and *Zizia*.

The name *americana* is not used for this species because of the uncertainty with respect to its identity. The type has not been located, and without that specimen it is not possible to relate it confidently to any of the apparently allied species.

Nomada (Nomadula) australis new species

FEMALE—Length 7-8 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks about two-thirds width of eye, posterior margin carinate; longer side of basal segment of flagellum equal in length to segment 2, segment 3 much shorter, not much longer than broad; mandibles slender and simple; wings hyaline basally, becoming quite deeply infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma piceous, basal vein interstitial with transverse median; tegulae deeply, distinctly and rather closely punctate, somewhat more sparsely so on outer and posterior margins; posterior margin of scutellum distinctly depressed medially; front coxal spines slender and elongate, quite densely pubescent; apex of hind tibiae with a row of four or five elongate, robust, piceous setae; general body color red, scape and basal segment of flagellum more reddish-testaceous, and a small amount of black around ocelli, head otherwise entirely red; lateral faces of propodeum black in large part, with a small reddish maculation posteriorly, and posterior face black below the triangle; scutum with an indistinct, median black line, the tubercles and tegulae somewhat tinged with yellow, thorax otherwise entirely deep red; front and mid legs somewhat more testaceous, hind legs more reddish, spurs pale yellow; abdomen entirely red, without maculations, apical margins of 2-4 becoming somewhat yellowish-hyaline; punctures deep, distinct, close and rather coarse over most of face, vertex and cheeks, only the supraclypeal area and clypeus very minutely and closely punctate; thorax rugoso-punctate in large part, coarsely so on pleura and scutum, very finely so on scutellum, lateral faces of propodeum somewhat smoother but dull, shallowly and rather finely rugose, posterior face more coarsely rugose below, the triangle smooth and impunctate but dull; basal abdominal tergum minutely and rather closely punctate apically, becoming more minutely, obscurely and more sparsely punctate basally; terga 2-5 with deep, distinct, rather fine and close punctures basally, these somewhat coarser and more widely separated but not sparse toward apical margins, only the narrow apical rims impunctate; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5, densely covered with short, more or less erect, silvery tomentum; sternum 5 with lateral tufts of robust elongate hairs on each side of midline apically; pubescence in general extremely short, thin and sparse, somewhat more evident on face, cheeks, thorax laterally and beneath, entirely whitish where visible.

MALE—Length 7-9 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks about two-thirds width of eye, posterior margin rounded, not carinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, about equal to segment 3 which has a minute, short but distinct spine beneath, following segments more or less spinose or nodulose beneath; mandibles slender and simple apically; wings hyaline basally, becoming rather deeply infuscated apically, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins and stigma piceous, basal vein interstitial or nearly with transverse median; tegulae closely, deeply, distinctly and quite uniformly punctate; posterior margin of scutellum quite deeply impressed medially; front coxal spines slender and elongate, rather densely pubescent; lower surface of hind femora flattened and more or less concave, posterior margin subcarinate; clypeus, labrum, mandibles except tips, lateral face marks, lower half of supraclypeal area, and scape anteriorly, bright yellow, head otherwise entirely black, lateral face marks ending narrowly on eye margin at level of antennae; antennal flagellum more testaceous basally, becoming somewhat reddish apically; tubercles, tegulae, front and mid legs largely reddish-testaceous, hind legs more reddish, spurs pale yellow; pronotal collar with a pair of inconspicuous yellow maculations, thorax otherwise black; abdomen black with reddish infusions and conspicuous yellow maculations, those on basal tergum small, submedian and lateral, widely separated; tergum 2 with a pair of large, cuneiform, lateral maculations

which are widely separated medially, the disc black, apical impressed areas becoming somewhat reddened; tergum 3 with a pair of more elongate, subtriangular lateral maculations which are rather widely separated medially, disc black, apical impressed rim more reddish; terga 4-6 with entire, transverse bands which are more or less submedian in position, apical rims distinctly reddish-hyaline; abdominal sterna blackish basally, apical rims broadly yellowish-hyaline; face above antennae and vertex coarsely, closely and deeply punctate, cheeks much more finely so, becoming rather finely rugose beneath, the lower maculated areas of face more sparsely and finely punctate, clypeus very minutely and densely so; thorax densely rugoso-punctate, coarsely so on mesopleura and scutum, finely so on scutellum, lateral faces of propodeum dull, shallowly and closely rugose or reticulate, posterior face becoming somewhat more coarsely so, triangle impunctate but densely tessellate; basal abdominal tergum finely, deeply, distinctly and rather closely punctate apically, punctures becoming very minute and indistinct on the shining base; punctures of terga 2-6 rather fine, close, deep and distinct basally, becoming somewhat coarser and more widely separated but not sparse apically, only the very narrow, apical margins impunctate, these somewhat broader on the more apical terga; basal width of pygidial plate about equal to median length, strongly narrowed apically and deeply, triangularly emarginate, lateral margins carinate, surface deeply, distinctly and rather coarsely punctate basally, becoming very closely and more finely so apically; sternum 5 with a dense, subapical fringe of elongate pale hairs; sternum 6 with a dense tuft of more erect, elongate hairs on each side of apex, and with a broader median fringe of somewhat shorter erect hairs; sternum 8 and genital armature similar to *rubicunda* (figs. 103 & 104); pubescence short, entirely pale, rather copious on head and thorax, hiding surface only beneath, extremely short over most of abdomen but somewhat more dense on sternal plates.

TYPES—Holotype: Female, Highlands Hammock State Park, Fla., April 5, 1959 (Mitchell, on *Bidens*). Allotype: Male, topotypical. [both author's coll.]. Paratypes: 3 ♀♀, 1 ♂, topotypical. FLORIDA: 2 ♀♀, Gainesville, April 13, 1924 (G. B. Merrill); 1 ♀, Lake Co., April 11, 1960 (H. V. Weems, Jr.); 1 ♂, Lake Co., April 6, 1956 (R. A. Morse, on *Erigeron quercifolius*). GEORGIA: 1 ♀, Fort Gordon, Richmond Co., April 26, 1959 (R. R. Snelling). SOUTH CAROLINA: 3 ♀♀, Dewees Is., April 29 (J. Bequaert). NORTH CAROLINA: 3 ♂♂, Sampson Co., April 13, 1954; 2 ♂♂, Ivanhoe, April 5, 1945 (on *Ilex*); 1 ♀, Pettigrew State Park, May 27, 1959 (on *Erigeron*); 1 ♀, Raleigh, May 2, 1948 (on *Senecio*); 1 ♀, Faison, April 20, 1955 (on *Fragaria*) (all Mitchell); 1 ♀, Raleigh, May 8, 1923 (C. S. Brimley); 1 ♀, Raleigh, May 17, 1951 (R. L. Sullivan); 1 ♂, Duplin Co., April 21, 1955 (D. A. Becker). NEW YORK: 1 ♂, Oliverea, June 18, 1934, (H. Dietrich). INDIANA: 1 ♂, Tippecanoe Co., May 22, 1956 (Montgomery, on *Gypsophila oldhamiana*).

Paratypes are in collections of the Florida Plant Board, the Museum of Comparative Zoology, Cornell University, Purdue University, the North Carolina Department of Agriculture, R. R. Snelling and the author.

This species is very close to *articulata* but seems to be distinct, even though the ranges of the two overlap. In the female the elongate, apical bristles of the hind tibiae will separate this species from *articulata*, but in the male the differences are primarily of color.

Nomada (Nomadula) rubicunda Olivier

(Figs. 103 & 104)

Nomada rubicunda Olivier, 1811. Encycl. Meth., v. 8, p. 365.

Nomada torrida Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 250.

FEMALE—Length 8.5-9.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks somewhat more than half width of eyes, posterior margin conspicuously carinate; longer side of basal segment of flagellum about equal to segment 2, median segments slightly longer than broad; mandibles slender and simple; wings subhyaline basally, becoming quite deeply infuscated apically and in marginal cell, but with a quite distinct hyaline area just beyond the discoidal and 3rd submarginal cells, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins piceous, basal vein interstitial or nearly with transverse median; tegulae uniformly deeply and finely punctate throughout, punctures crowded; posterior margin of scutellum quite deeply grooved; front coxal spines well developed, quite densely pubescent; apex of hind tibiae with a single, slightly oblique, robust, brownish and rather elongate seta; head, thorax and abdomen largely red, the scape, pedicel and basal seg-

ment of flagellum more testaceous, following segments of flagellum more brownish beneath, black above; clypeus somewhat more reddish-testaceous; front and middle legs reddish-testaceous, spurs pale yellow, hind legs more ferruginous; pronotal collar somewhat more yellowish, scutellum and axillae yellowish in large part, metapleura and adjacent margin of propodeum black, and middle and hind coxae largely black posteriorly, more or less ferruginous anteriorly; abdominal tergum 3 with a pair of small, widely separated, yellow maculations, 4 and 5 with transverse, subapical ivory bands, that on 4 rather narrow, much broader on 5, discs of these terga black, the more basal terga entirely ferruginous and the sterna entirely ferruginous; punctures coarse, deep and close on face above antennae, on vertex, cheeks, and across face between antennae and clypeal margin, clypeus very finely and closely punctate; scutum and scutellum very coarsely rugoso-punctate, pleura below more distinctly punctate, becoming coarsely rugose laterally and above; lateral faces of propodeum dull, with shallow, vague but coarse, close punctures, posterior face obscurely punctate, triangle impunctate but rather dull, becoming rather finely and irregularly striate along upper margin; basal abdominal tergum finely and closely punctate across apical half, punctures becoming more minute and somewhat more sparse toward base; terga 2-4 deeply, distinctly, rather uniformly and closely punctate throughout, only the very narrow apical rims impunctate; tergum 5 with finer and quite densely crowded punctures throughout; pseudopygidium transverse, extremely short, evident only as an apical fringe of short, dense, pale yellowish hairs; pubescence extremely short, thin and obscure, entirely whitish where evident, sternum 5 with dense, lateral tufts of long, densely plumose, fuscous hairs.

MALE—Length 7-9.5 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks only slightly narrower than eyes, posterior margin carinate; antennal scape considerably swollen, apex deeply excavated and completely hiding pedicel, basal segment of flagellum much shorter than segment 2, even on longer side, median segments about as broad as long, segment 3 much shorter than 2, with a distinct but short and fine ventral spine; mandibles slender and simple; wings hyaline basally, becoming rather densely infuscated along outer margin and in marginal cell, but with a hyaline area just beyond the discoidal and submarginal cells, with the usual three submarginals, 2nd very much broader than 3rd anteriorly, veins piceous in general, stigma somewhat more testaceous, basal vein interstitial or nearly with transverse median; tegulae uniformly deeply, closely and distinctly punctate throughout; posterior margin of scutellum rather deeply grooved or impressed medially; front coxal spines rather short, subtriangular, quite densely pubescent; hind femora unmodified; clypeus, adjacent lateral areas of face, labrum, mandibles except tips, a rather large spot on supraclypeal area, and antennal scape, bright yellow, head otherwise black; pronotal collar, tubercles, tegulae, scutellum and axillae, two spots on metanotum, and an anterior spot on mesopleura, bright yellow, thorax otherwise black; legs reddish-testaceous, spurs pale yellow, basal half of hind femora infuscated; abdominal terga with conspicuous yellow maculations, that on basal tergum interrupted medially, the resulting lateral spots with a deep emargination on apical margin, intervening area somewhat ferruginous; tergum 2 with extensive yellow maculae on each side, these very narrowly united medially, basal area of disc between them black, apical area somewhat reddened; terga 3-6 with transverse, submedian, yellow bands that are of rather uniform width, apical portion of 5 and 6 beyond the bands more ferruginous; abdominal sterna largely dark, but 3 and 4 with rather small and obscure, sublateral maculations; punctures coarse, deep and close on face above antennae, vertex and cheeks, and rather coarse and deep between antennae and clypeus, punctures of clypeus extremely minute and close, lateral areas shining, with sparse, irregular, scattered punctures; scutum, scutellum and mesopleura coarsely and densely rugoso-punctate, lateral faces of propodeum somewhat smoother but with fine, shallow and rather coarse, vague punctures, posterior face quite closely and shallowly punctate and dull, triangle impunctate, tessellate, becoming irregularly striate along upper margin; basal abdominal tergum quite closely and finely punctate apically, punctures becoming very minute and indistinct toward base; terga 2-5 with deep, distinct quite fine but close and uniform punctures throughout, only the very narrow, apical rims impunctate; pubescence very short, entirely pale but evident, whitish below, somewhat more yellowish above, hardly evident on abdomen basally, but the more apical sterna quite densely long pubescent toward apical margin, sternum 6 with a conspicuous, apical fringe of erect, more or less curved, yellowish hairs; basal width of pygidial plate about equal to median length, strongly narrowed to the somewhat deeply incised apex, lateral margins carinate, surface quite closely and deeply punctate toward base, becoming very finely to minutely punctate toward tip; sternum 8 (fig. 104) broadly produced apically, rounded, the apex fringed with robust, ventrally pro-

jecting setae; gonocoxites of genital armature (fig. 103) not lobate at base, slightly angulate on inner margin medially, gonostyli slender and elongate, simple, tufted apically.

DISTRIBUTION — Michigan to New York, south to Texas and Florida, March to June.

FLOWER RECORDS — *Crataegus, Fragaria, Melilotus,* and *Rubus.*

Nomada (Nomadula) seneciophila new species

FEMALE—Length 7-8 mm.; lateral ocelli considerably nearer margin of vertex than to each other; longer side of basal segment of flagellum equal to segment 2, but this only slightly longer than broad, median segments slightly shorter; mandibles slender and simple; wings hyaline basally, becoming somewhat infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly; veins piceous to black, stigma somewhat more brownish-testaceous, basal vein interstitial with transverse median; tegulae closely, deeply, distinctly and rather uniformly punctate throughout; posterior margin of scutellum quite deeply grooved medially; front coxal spines rather short and triangular, quite densely pubescent; apex of hind tibiae with a row of three or four elongate, robust, fuscous bristles; body color red in large part, scape and basal segment of flagellum anteriorly more testaceous, area around ocelli and posterior margin of cheeks black; tubercles and tegulae somewhat more testaceous; legs reddish-testaceous, spurs pale yellow; scutum with a narrow, median, black line and metapleura and propodeum entirely black, thorax otherwise deep red; abdominal terga red but with small yellow maculations, those on tergum 2 small, widely separated, submedian if evident on 3, tergum 4 with a transverse, yellow band near midline, 5 with a pair of spots, sterna largely red; punctures coarse, deep, distinct and very close on face above, on vertex and on cheeks, slightly separated, deep and rather coarse on face below antennae, the clypeus and supraclypeal area with very fine, densely crowded punctures; scutum, scutellum and mesopleura densely and coarsely rugoso-punctate; propodeum dull, shallowly but very fine and closely rugoso-punctate, the triangle impunctate but dull and tessellate; basal abdominal tergum very finely and rather closely punctate toward apical margin, punctures becoming more minute and inconspicuous basally; terga 2-5 very finely, closely, deeply and distinctly punctate, only the very narrow apical rims impunctate, these becoming yellowish-hyaline on the more apical terga; pseudopygidium transverse, very short, forming the rather narrowly truncate apical margin of tergum 5, densely covered with short, suberect, pale yellowish pubescence; sternum 5 with a dense apical tuft of elongate, plumose hairs on each side apically; pubescence in general very short and thin, entirely pale, rather conspicuous on face, cheeks, over most of thorax, and on apical segments of abdomen.

MALE—Length 8 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin subcarinate; antennal scape slightly swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum very short, segment 2 somewhat longer but not much longer than broad, 3 nearly equal to 2, with a distinct but short and very slender spine beneath, median segments about as long as broad; mandibles slender and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd about equal in width anteriorly, veins testaceous to piceous, basal vein interstitial with transverse median; tegulae uniformly very finely, closely and rather deeply punctate; posterior margin of scutellum slightly impressed medially; front coxal spines very short, subtriangular, quite densely pubescent; ventral surface of hind femora considerably flattened but not concave; clypeus, adjacent lateral areas of face, labrum, and basal half of mandibles, bright yellow, lateral maculae continuing narrowly up eye margin to level of antennae; scape and basal part of flagellum bright yellow anteriorly, the more apical antennal segments more testaceous beneath, somewhat more reddish above; head otherwise black; tubercles and tegulae bright yellow, legs largely testaceous, spurs pale yellow, and pleura with a very small, anterior, yellow spot, thorax otherwise black; basal abdominal tergum piceous toward base, more testaceous apically, with a pair of widely separated, very narrow, lateral, yellow maculations; tergum 2 with a conspicuous, transverse, yellow band which is quite broad laterally, strongly narrowed and subinterrupted medially, basal area of disc blackish, apical portion more testaceous-hyaline; terga 3-6 with transverse yellow bands that are submedian in position, discs dark basally, testaceous-hyaline apically, bands with lateral interruptions on 4 and 5, that on 6 rather short, sometimes with small lateral spots at extreme sides; abdominal sterna piceous or blackish basally, more testaceous-hyaline apically; punctures coarse, deep, distinct and close on face above antennae and on vertex, those on cheeks very much finer and very close, deep and distinct on each side below antennae, but

minute and very close on supraclypeal area and clypeus, the lateral yellow areas somewhat more sparsely and obscurely punctate; scutum, scutellum and pleura densely and rather coarsely rugoso-punctate, somewhat more finely so on scutellum; lateral faces of propodeum somewhat smoother, but with shallow, obscure, close punctures or reticulations, posterior face quite coarsely, closely and shallowly punctate, triangle impunctate but rather dull; punctures of basal abdominal tergum minute and rather close, barely visible; terga 2-6 with deep, distinct, close and rather fine punctures, only the narrow apical rims becoming impunctate, the more apical terga with somewhat coarser and more widely spaced punctures; pygidial plate about as broad at base as median length, strongly narrowed apically, tip subtruncate or with a very slight median incision, lateral margins carinate, surface deeply and distinctly punctate toward base, the punctures becoming minute and obscure apically; sterna 3-5 with rather thin, subapical fringes of elongate pale hairs, that on 5 quite dense, 6 with dense tufts of elongate, yellowish hairs on each side that are directed toward the base, and with a submedian tuft of shorter hairs; pubescence otherwise very short, thin but rather copious over most of head and thorax, very minute and indistinct on abdomen dorsally; sternum 8 and genital armature as in *rubicunda* (figs. 103 & 104).

TYPES—Holotype: Female, Wake Co., N. C., May 7, 1960. Allotype: Male, topotypical (both Mitchell, on *Senecio*) [author's coll.]. Paratypes: NORTH CAROLINA: 2 ♂♂, Raleigh, early May, 1921; 1 ♂, Raleigh, April 26, 1922 (on *Rubus*); 2 ♂♂, Raleigh, May 1, 1922 (on *Senecio*); 1 ♂, Raleigh, May 2, 1948 (on *Senecio*); 1 ♂, Raleigh, May 15, 1961; 1 ♂, Blue Ridge Pkwy., Wilkes Co., June 2, 1950 (all Mitchell); 1 ♂, Durham, May 11, 1952. (R. D. Cuyler); 2 ♂♂, Mt. Graybeard, May 23 (N. Banks); 5 ♀♀, Raleigh, April 24-May 30, 1941 & 42. FLORIDA: 1 ♀, Florida Caverns St. Pk., Jackson Co., April 13, 1960 (H. V. Weems, Jr., on *Senecio*).

Paratypes are in collections of the Florida Plant Board, the North Carolina Department of Agriculture, the Museum of Comparative Zoology, and the author.

Table 11—Distribution of species of *Nomada (Gnathias, Micronomada, Holonomada, Centrias* and *Nomadula)* by states.

	New England						North Central						Mid Atlantic							South-eastern					
Nomada (Gnathias)	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
bella	X	X	X	X		X		X											X								X
cuneata		X		X		X		X					X		X	X		X	X			X					
hydrophylli									X							X											
lepida	X	X		X		X		X	X	X		X	X		X			X	X	X		X	X			X	
louisianae												X							X	X			X				
maculata	X			X		X		X					X						X	X							
ovata	X	X		X		X	X	X	X		X		X		X	X			X	X	X	X	X				
perplexa				X		X		X		X	X		X		X				X	X	X	X					
subnigrocincta														X													
volatilis			X	X				X			X		X			X			X	X							
(Micronomada)																											
fervida																							X			X	X
heiligbrodtii				X		X		X											X			X			X	X	X
modesta													X	X								X			X		
texana				X		X		X											X			X			X		
wisconsinensis							X	X																			
(Holonomada)																											
affabilis				X					X		X								X	X	X	X				X	X
superba									X	X	X															X	
(Centrias)																											
erigeronis				X					X																		
(Nomadula)																											
articulata				X	X	X		X	X	X	X	X	X	X	X			X	X	X		X				X	X
australis										X			X									X	X			X	X
rubicunda								X					X									X	X			X	X
seneciophila																						X					X

Nomada (Callinomada) aquilarum Cockerell

Nomada aquilarum Cockerell, 1903. Ann. Mag. Nat. Hist. (7) 12, p. 208. ♂.

Nomada cockerelli Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1, p. 240.

Nomada (Holonomada) dacotensis Swenk, 1913. Nebr. Univ., Studies 12, p. 88. ♀.

FEMALE—Length 8-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks about as broad as eyes, posterior margin carinate; shorter side of basal segment of flagellum equal to segment 2 in length, median segments fully as broad as long; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically, but with a definitely hyaline area just beyond the discoidal and submarginal cells, with the usual three submarginal cells, 2nd somewhat broader anterior-

ly than 3rd, veins testaceous to piceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae shining, very sparsely punctate except along inner margin; posterior margin of scutellum very slightly grooved medially; front coxae with short, acute, triangular tubercles that are obscured by the pubescence; apex of hind tibiae with a row of 5 or 6 very short setae; face with a pair of much abbreviated, ivory maculations adjacent to eyes below, head otherwise black; antennal scape reddish, flagellum more reddish-testaceous beneath, piceous above, tubercles and posterior band on scutellum ivory, outer half of tegulae and a narrow median band on pronotal collar maculated in some specimens, thorax otherwise black; femora and trochanters largely piceous, front femora and tibiae yellowish maculated apically, otherwise black, hind tarsi largely piceous, mid and front tarsi more reddish-testaceous, spurs pale yellow; basal abdominal tergum entirely black, terga 2-6 with conspicuous, ivory maculae, interrupted medially on 2-4, very broad laterally and triangularly pointed medially on 2 and 3, entire on 5 but narrowed laterally; abdominal sterna largely black, but 3 and 4 often with narrow, subapical, ivory bands that are more or less widely interrupted medially; punctures of face, vertex and cheeks deep, distinct and quite close, somewhat coarser on vertex and upper half of face, rather fine and very close on cheeks below and on lower half of face; scutum, scutellum and mesopleura rather coarsely and densely rugosopunctate, punctures somewhat more distinct on pleura below and on scutellum, propodeum posteriorly with rather fine, close punctures just below the impunctate triangle, this and the lateral surfaces dull and densely tessellate; basal abdominal tergum with minute, rather close punctures just before the impressed apical margin, these becoming minute and inevident toward the shining base; discs of terga 2-6 with deep, distinct, minute and rather close punctures, apical margins rather narrowly impunctate; pseudopygidium of the usual form; pubescence extremely short and thin, hardly visible, apparently entirely pale.

MALE—Length 8 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks fully as broad as eyes, posterior margin not carinate; antennal scape not much swollen, apex rather deeply excavated and partially enclosing pedicel, basal segment of flagellum slightly longer than segment 2, median segments fully as broad as long; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically, but with a definite hyaline area just beyond the discoidal and submarginal cells, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins testaceous to piceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae shining, very sparsely punctate except along inner margin; posterior margin of scutellum slightly grooved medially; front coxae with short but rather robust, triangular spines that are obscured by the pubescence; hind femora unmodified; clypeus and labrum in large part, mandibles at base, and a pair of much abbreviated, lateral maculae, pale yellowish-white or ivory, upper third of clypeus black, head otherwise black; antennal scape yellowish-testaceous anteriorly, flagellum more reddish-testaceous beneath, piceous above; tubercles, outer half of tegulae, a narrow median band on pronotal collar, and a pair of spots on scutellum, ivory; thorax otherwise entirely black; femora and trochanters largely piceous, front femora more yellowish anteriorly, tibiae yellowish at base and apex on outer surface, these narrowly connected, surface otherwise piceous to testaceous, hind tarsi largely piceous, mid and front tarsi more reddish-testaceous, spurs pale yellow; basal abdominal tergum entirely black, terga 2-6 with conspicuous, ivory maculae, interrupted medially on 1-3, very broad laterally and triangularly pointed medially on 2 and 3, entire and of rather uniform width on 5 and 6, on which the apical margins are reddish-hyaline; abdominal sterna largely black, yellowish-hyaline apically, sterna 3-5 with narrow, subapical, ivory bands that are more or less widely interrupted medially; punctures of face, vertex and cheeks deep, distinct and quite close, somewhat coarser and more widely separated on vertex, rather fine and very close on cheeks below and on lower half of face, supraclypeal area rather coarsely rugoso-striate, punctures of maculated area of clypeus more vague and irregular; scutum, scutellum and mesopleura rather coarsely and densely rugoso-punctate, punctures somewhat more distinct on pleura below and on scutellum, propodeum posteriorly with rather fine, shallow, but close punctures just below the impunctate triangle, this and the lateral surfaces dull and densely tessellate; basal abdominal tergum with minute, rather close punctures just before the impressed apical margin, these becoming minute and inevident toward the shining base; discs of terga 2-6 with deep, distinct, rather close and fine punctures, apical margins rather narrowly impunctate and more or less yellowish-hyaline, the punctures slightly coarser on the more apical terga; pubescence extremely short and thin but rather copious over head and thorax, more whitish below, more yellowish above, very fine and inconspicuous on abdomen; median length of pygidial plate about equal to

basal width, rather strongly narrowed to the narrowly rounded apex, margins carinate, surface rather shallowly rugoso-punctate; sternum 8 and genital armature similar to *placida* (figs. 103 & 104).

DISTRIBUTION—Chiefly western, but found in Wisconsin, in July.

FLOWER RECORDS—This species has been recorded on *Erigeron, Grindelia, Lactuca, Melilotus* and *Solidago.*

Nomada (Callinomada) placida Cresson

(Figs. 103 & 104)

Nomada placida Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 291. ♀ ♂.

Holonomada placida Robertson, 1903. Canad. Ent. 35, p. 177. ♀ ♂.

Holonomada placida Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Nomada (Callinomada) placida Rodeck, 1945. Ent. News 56, p. 181.

FEMALE—Length 7-8 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly more than half width of eyes, posterior margin subcarinate; shorter side of basal segment of flagellum equal to segment 2, median segments about as broad as long; mandibles slender and simple apically; wings lightly infuscated, not much darker apically, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins testaceous to piceous, stigma somewhat more ferruginous, basal vein interstitial with transverse median; tegulae shining, punctures minute, sparse and obscure; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; apex of hind tibiae with a row of four rather short but robust, dark bristles; clypeus, lateral face marks, labrum and mandibles except tips, yellow, to some degree tinged with ferruginous, face marks ending narrowly on margin near top of eye, and cheeks very narrowly yellow adjacent to eye margin below; head otherwise, black, antennal scape testaceous, flagellum more brownish-testaceous below, becoming piceous above; pronotal collar, tubercles, tegulae, scutellum, adjacent median area of metanotum, and a rather large anterior maculation on mesopleura, bright yellow; thorax otherwise black, legs reddish-testaceous basally, tibiae yellow in large part, with reddish infusions, tarsi yellow at base, becoming somewhat reddened on apical segments, spurs pale yellow; basal abdominal tergum entirely dark, terga 2-5 with transverse, median, yellow bands, those on 2 and 3 broad laterally, more or less deeply constricted medially, slightly interrupted on 3, those on 4 and 5 of more uniform width; abdominal sterna largely dark, but 3 and 4 to some degree yellow banded; punctures over entire head quite uniformly, deeply, closely, distinctly and rather coarsely punctate, only the clypeus becoming somewhat more finely and closely punctate medially; scutum densely and rather coarsely rugoso-punctate; punctures of scutellum and of mesopleura below somewhat coarser and more distinct, becoming crowded on pleura above; propodeum dull, densely and finely rugose posteriorly and to some degree on each side, becoming somewhat smoother toward mid coxae, triangle impunctate but densely tessellate and dull, becoming obscurely and finely striate along upper margin; abdominal terga deeply, finely, distinctly and very closely punctate throughout, only the very narrow apical rims impunctate, this somewhat broader on tergum 4 where it is yellowish-hyaline; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely covered with suberect, whitish tomentum; pubescence extremely short, thin and obscure, hardly visible, entirely pale where evident, sternum 5 with an apical tuft of elongate, somewhat curved, brownish hairs on each side of mid-line.

MALE—Length 7 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat more than half width of eyes, posterior margin subcarinate; antennal scape only slightly swollen, apex deeply excavated and partially enclosing pedicel, shorter side of basal segment of flagellum fully equal to segment 2, median segments fully as broad as long; mandibles slender and simple apically; wings hyaline basally becoming faintly infuscated apically, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous to piceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae shining, punctures rather fine but deep and distinct, rather sparse except anteriorly; posterior margin of scutellum only faintly impressed; front coxae not spinose; hind femora unmodified; clypeus, labrum, mandibles except tips, the narrow malar space and lateral margins adjacent to clypeus, yellowish; head otherwise black, antennal scape more testaceous anteriorly, flagellum reddish-testaceous beneath, becoming piceous above; punctures rather uniformly deep, distinct, close and rather coarse over entire head, becoming somewhat finer below antennae and over median area of clypeus; scutum densely rugoso-punctate, rather finely so laterally, scutellum and mesopleura more coarsely and distinctly

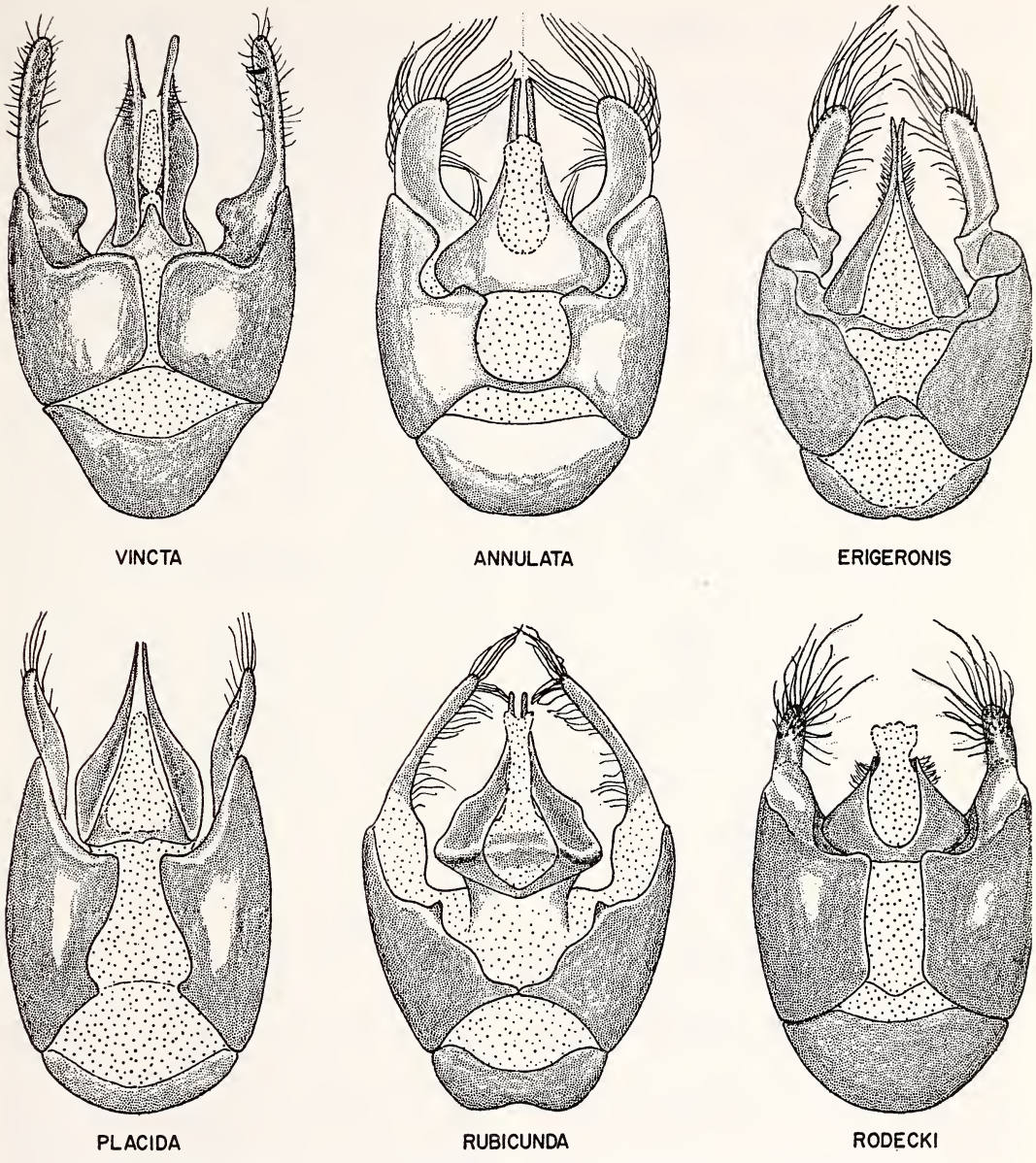


Figure 103—Dorsal views of genital armature in males of species of *Nomada*.

punctate, the punctures becoming crowded on pleura above; propodeum somewhat more finely but very densely rugoso-punctate, lateral faces becoming somewhat shining toward mid coxae, triangle impunctate but dull and densely tessellate, obscurely short-striate along upper margin; abdominal terga quite uniformly, deeply, very closely and rather finely punctate throughout, only the very narrow apical rims impunctate, and punctures somewhat coarser and more distinctly separated on the more apical terga; pubescence extremely short, thin and obscure, entirely pale where visible; median length of pygidial plate subequal to basal width, slightly narrowed to the abruptly truncate tip, margins carinate, surface rather coarsely but shallowly rugoso-punctate; abdominal sterna deeply, closely and rather finely punctate, depressed rims rather broad, yellowish-hyaline; sternum 6 rather broadly rounded; apical process of sternum 8 (fig. 104) broadly rounded, fringed with robust, ventrally directed setae; gonocoxites of genital armature (fig. 103) broad at base, not

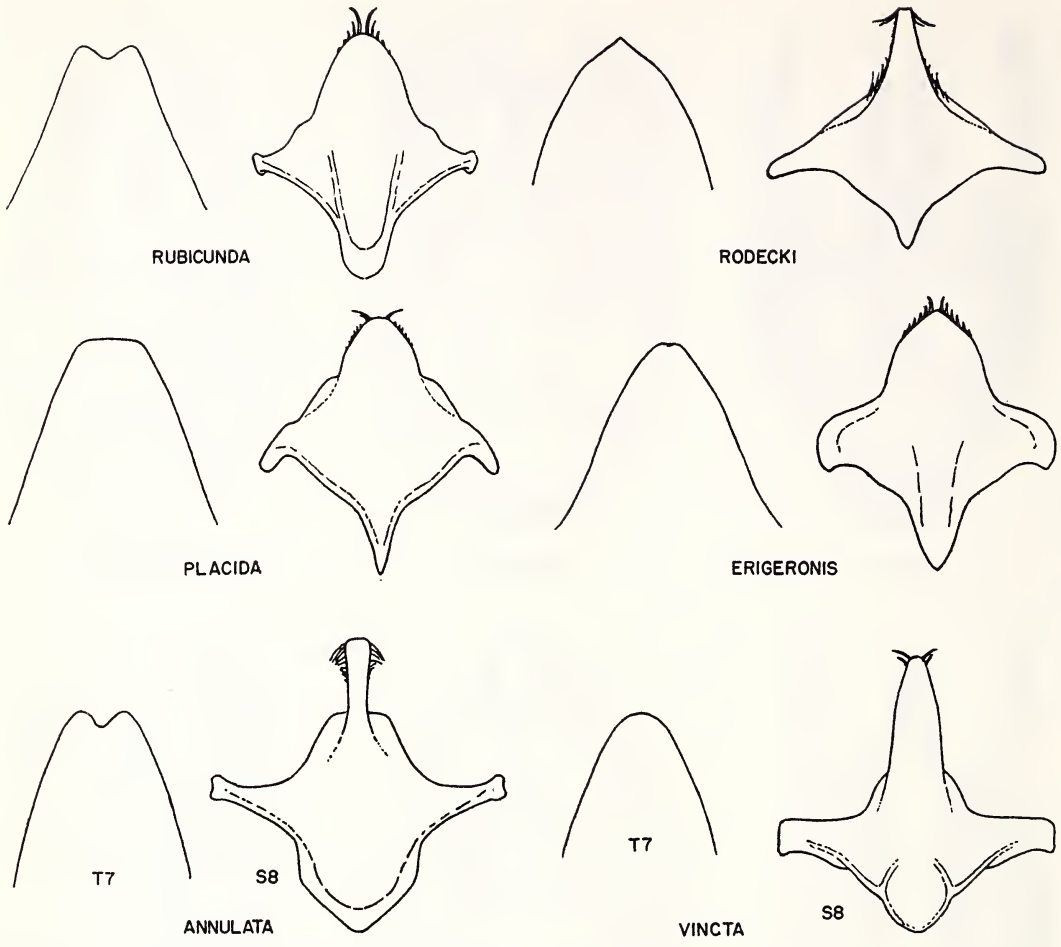


Figure 104—Tergum 7 and sternum 8 in males of species of *Nomada*.

lobate, gonostyli slender and quite short, sparsely tufted apically, neither produced nor tufted at base beneath.

DISTRIBUTION — Nebraska to New York, south to North Carolina, August to October.

FLOWER RECORDS — *Aster*. Robertson (1929) records *placida* also on *Boltonia* and *Solidago*.

Nomada (Callinomada) rodecki
new species
(Figs. 103 & 104)

MALE—Length 9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks only slightly narrower than eyes, hind margin quite strongly carinate; antennal scape quite slender, not much broader than flagellum, apex rather deeply excavated but not completely enclosing pedicel, shorter side of basal segment of flagellum nearly as long as segment 2, median segments only very slightly longer than broad; mandibles rather robust, simple; wings hyaline basally, becoming rather deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd very short anteriorly, much narrower than 3rd, veins testaceous to piceous, basal vein interstitial with transverse median; tegulae shining between quite coarse, close and deep punctures; posterior margin of scutellum only slightly impressed medially; front coxae not spinose; hind femora unmodified; labrum, clypeus except narrow upper margin, mandibles except tips, a very small spot on supraclypeal area, and small lateral maculations, bright yellow, the lateral maculations not reaching level of antennae and interrupted by a dark-

ened area near lower end of eye; face, vertex and cheeks otherwise black; antennal scape largely yellow, flagellum more brownish-testaceous below, more piceous above; pronotal collar, tubercles, tegulae, scutellum except anterior and posterior margins, and two large lateral maculations on posterior face of propodeum, bright yellow; thorax otherwise black; tibiae and tarsi bright yellow, front femora yellow beneath and toward apex, mid and hind femora more narrowly yellow at apex, otherwise legs piceous to testaceous basally, spurs pale yellow; basal abdominal tergum mostly piceous, but with a vague, more or less yellowish median band; terga 2-4 with transverse, basal, yellow bands that are broad laterally, much narrowed or interrupted medially, discs piceous apically; terga 5 and 6 with submedian, transverse, yellow bands that are more or less interrupted medially; abdominal sterna 1 and 2 largely dark, 3-5 with transverse, yellow, basal bands; punctures very coarse, close and deep over most of head, becoming somewhat finer, shallower and closer on clypeus, supraclypeal area rather densely and finely rugose; punctures of scutellum deep and contiguous, rather irregular as to size, somewhat finer laterally, very coarse over median area; scutellum somewhat more finely and very closely punctate; mesopleura very coarsely and deeply punctate, with some very narrow, shining interspaces evident, but contiguous in general; lateral faces of propodeum somewhat shining, with very fine, scattered, irregular rugosities above and posteriorly, posterior face more shining, punctures coarse, close and deep laterally, median area and triangle impunctate; basal abdominal tergum minutely and rather closely punctate apically, punctures becoming increasingly minute toward base; terga 2-5 with deeper, more distinct but still fine and close punctures, these becoming somewhat more minute toward the narrowly impunctate apical rims on 2 and 3, but becoming somewhat coarser and distinct on 4 and 5, very close and fine but deep and distinct over entire disc of 6; pubescence extremely short, thin and obscure, entirely pale where visible, somewhat more evident on face, cheeks below, venter of thorax and on the more apical abdominal segments; basal width of pygidial plate somewhat greater than median length, obtusely angulate at apex, margins carinate, surface very densely and finely rugoso-punctate; sternum 6 rather broadly rounded apically; sternum 8 (fig. 104) with a slender, apical process, obscurely fringed except at apex; gonocoxites of genital armature (fig. 103) broad at base, not lobate, gonostyli very short, conspicuously tufted, not produced at base beneath, penis valves strongly flexed, the apices directed ventrally (thus hidden from view in figure).

TYPE—Holotype: Male, Southern Pines, N. C., May 12, 1950 (T. B. Mitchell).

Nomada (Phor) integerrima Dalla Torre

Nomada integra Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 276. ♀ ♂. Preocc.

Nomada integerrima Dalla Torre, 1896. Cat. Hym. v. 10, p. 353. N. name.

Phor integer Robertson, 1903. Canad. Ent. 35, pp. 174, 175, 177. ♀ ♂.

Phor integer Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; shorter side of basal segment of flagellum fully equal to segment 2 which is only very slightly longer than broad, median segments fully as broad as long; mandibles slender and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd nearly equal in breadth anteriorly, veins testaceous to piceous, basal vein interstitial with or slightly basad of transverse median vein; tegulae shining between fine but quite deep, distinct and rather sparse punctures; posterior margin of scutellum quite deeply grooved medially; front coxae with short, triangular spines; apex of hind tibiae with a row of 5 or 6 elongate, piceous bristles; head and thorax preponderantly red, with black maculations, tubercles and tegulae somewhat more testaceous, legs reddish-testaceous, spurs pale yellow; face black around and between bases of antennae and ocelli, and along posterior margin of cheeks; prothorax laterally, mesothorax beneath, metapleura and adjacent area of propodeum, and a median band on scutum and posterior face of propodeum, black; abdomen red in general, basal tergum entirely so, terga 2 and 3 with widely separated, lateral, yellow maculations, 4 with a pair of transverse, submedian bands that are slightly separated medially, and 5 with a rectangular, subapical, yellow blotch; punctures coarse, close and deep on face above antennae and on vertex, somewhat finer on cheeks, very fine and close on supraclypeal area and clypeus, becoming somewhat more sparse and distinct on lateral areas of face below; scutum, scutellum and pleura coarsely rugoso-punctate, the scutum somewhat more finely and densely so anteriorly; metapleura and propodeum in large part somewhat more finely and shallowly rugoso-punctate, triangle impunctate, becoming rather coarsely rugoso-striate along upper margin; basal abdominal

tergum shining, punctures exceedingly minute, hardly visible; terga 2-5 very finely but more distinctly punctate, punctures rather close and uniformly distributed, becoming somewhat more sparse and minute toward apical margins of each tergum, but only the narrow apical rims impunctate, these more or less yellowish-hyaline; punctures of tergum 5 somewhat more distinct and very close basally, becoming coarser apically; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely covered with pale yellowish, suberect tomentum; pubescence short, rather thin, entirely pale, rather copious on head and thorax, becoming somewhat yellowish above, hardly evident on abdominal terga, but becoming more evident apically, sternum 5 with lateral tufts of elongate, curved, fuscous hairs on each side of mid-line apically.

MALE—Length 5.5-8 mm.; space between lateral ocelli and margin of vertex about half that separating the ocelli; cheeks only slightly narrower than eyes, posterior margin subcarinate; antennal scape considerably swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, no longer anteriorly than the apical breadth, segment 2 slightly longer, median segments about as broad as long; mandibles slender and simple; wings largely hyaline, becoming slightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous, basal vein interstitial with or slightly basad of transverse median; tegulae somewhat shining between rather deep, distinct and close punctures; posterior margin of scutellum rather deeply grooved medially; front coxae with very short, triangular, posterior spines or tubercles; hind femora slender and simple; clypeus except upper margin, narrow lateral face marks, labrum and mandibles, bright yellow, the face marks extended very narrowly along margin of eye to level of antennae, head otherwise black; antennal scape narrowly yellowish-testaceous anteriorly, flagellum more reddish-testaceous beneath, somewhat darker above; thorax largely or entirely black, tubercles more or less yellowish-testaceous, tegulae yellowish-hyaline, front and mid legs testaceous, hind femora piceous but the tibiae and tarsi testaceous, spurs pale yellow; basal abdominal tergum largely piceous, but the slightly impressed, apical margin more ferruginous; terga 2 and 3 with widely separated, lateral, yellow maculae, 4 with very inconspicuous or vague maculations or none, 5 with a pair of small, sublateral maculations that are slightly separated medially, and 6 with a more median, entire maculation; abdominal sterna largely testaceous, margins more or less yellowish-hyaline; punctures coarse, deep and very close on face above antennae and on vertex, somewhat finer and very close on cheeks, very fine and close on face and clypeus below; scutum, scutellum and mesopleura quite coarsely and densely rugosopunctate, the metapleura and propodeum somewhat more shallowly but rather coarsely rugose, triangle impunctate but rather dull, upper margin becoming quite densely rugosostriate; basal abdominal tergum shining, punctures extremely minute, hardly visible but rather close; discs of terga 2-6 with very fine, slightly separated but rather uniform punctures, apical impressed areas becoming more minutely and sparsely punctate, rims very narrowly impunctate, these areas becoming yellowish-hyaline; pubescence entirely pale, rather copious over head and thorax, dense and subappressed on face below antennae, more elongate and erect above, quite dense and elongate on thorax laterally and beneath, very short and obscure on abdomen, the more apical sternal plates without conspicuous fringes, sternum 7 rather densely covered toward apex with rather short but erect whitish hairs; pygidial plate somewhat longer than basal width, rather strongly narrowed apically to the narrowly truncate apex, margins carinate, surface quite closely and rather coarsely rugoso-punctate; sternum 8 and genital armature much as in the *maculata* (fig. 98), but gonostyli more slender and less robust, narrowly rounded at tip.

DISTRIBUTION—Minnesota to Quebec and the New England states, south to Louisiana and North Carolina, March to August.

FLOWER RECORDS—*Rubus* and *Salix*. Recorded by Robertson (1929) also on *Antennaria, Claytonia, Dentaria, Heracleum* and *Prunus*.

Nomada (?Phor) proxima Cresson

Nomada proxima Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 294. ♂.

Nomada (Phor) proxima Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22 (3), p. 726.

MALE—Length 9 mm.; lateral ocelli slightly nearer margin of vertex than to eyes; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments only slightly longer than broad; mandibles simple; wings hyaline, faintly clouded along outer margin, veins brownish-testaceous; 3rd submarginal cell slightly narrower than 2nd anteriorly,

basal vein distinctly basad of transverse median; tegulae testaceous, shining, rather closely punctate; scutellum rounded, not at all grooved; front coxae not spinose; hind femora unmodified; labrum, mandibles except tips, lower half of clypeus, and narrow lateral face marks, yellow; scape entirely black, flagellum brownish beneath, black above; head otherwise black; thorax entirely black, with only the tubercles yellowish; terga 2-6 with transverse yellow maculations, that on 2 narrowed and interrupted medially, subinterrupted on 3 and 4, entire on 5 and 6, discs otherwise blackish; sterna also with rather narrow, transverse, yellow bands on 2-5; pygidium narrowed and truncate apically, margins carinate, surface closely punctured; head and thorax quite coarsely rugoso-punctate, propodeal triangle smooth below, but rugose across upper half; abdominal terga finely and closely punctured but punctures not crowded; pubescence of head and thorax quite copious and erect, yellowish, very fine and subappressed on abdomen.

TYPE LOCALITY—Maine.

This species is based on a single male specimen which was described nearly 100 year ago. No specimens assignable to it have appeared in any of the collections made, or received for study, and apparently it remains to be rediscovered, along with the unknown female. Robertson placed it with *integerrima* (*integra*) in the genus *Phor*, but there is no evidence that he ever collected any specimens, and possibly he had not seen the type. Thus its inclusion in *Phor* seems hardly justified, and the determination of its place in this scheme of classification must await its rediscovery.

Nomada (Pachynomada) vincta vincta Say

(Figs. 103 & 104)

Nomada vincta Say, 1837. Boston Jour. Nat. Hist. 1, p. 401. ♀.

Holonomada vincta Robertson, 1903. Canad. Ent. 35, p. 177. ♀ ♂.

Holonomada vincta Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9.5-12 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin not carinate; shorter side of basal segment of flagellum fully equal to segment 2 in length, median segments slightly longer than broad; mandibles simple, rather robust; wings lightly infuscated, slightly darker apically, with the usual three submarginal cells, 2nd somewhat narrower than 3rd anteriorly, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining between rather deep and distinct but fine and evenly distributed punctures; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; apex of hind tibiae with a row of 3-6 rather short but robust, testaceous bristles; clypeus and supraclypeal area yellowish-testaceous, the labrum, basal half of mandibles, and broad, lateral, facial maculae, bright yellow, the lateral maculae terminating rather narrowly at top of eye, and cheeks very narrowly rimmed with yellow along eye margin; otherwise upper portion of face, vertex and cheeks black; antennal scape, pedicel and basal segment of flagellum testaceous, flagellum otherwise more piceous; pronotal collar, tubercles, tegulae, scutellum in large part, adjacent median area of metanotum, a pair of broad maculae on propodeum, a large anterior maculation on mesopleura, and front, mid and hind coxae in large part, bright yellow; thorax otherwise black, scutellum rimmed with black both anteriorly and posteriorly, and with a median black line; trochanters piceous, femora testaceous, more or less piceous along lower margin, tibiae and tarsi bright yellow, spurs pale yellow; abdominal terga 1-5 with transverse, entire, submedian, yellow bands, these somewhat narrowed medially on 1-3, very broad on 5, covering most of the disc; abdominal sterna piceous, 2-4 with more or less complete, submedian yellow bands; punctures over entire head quite close, deep and distinct, somewhat finer on cheeks and vertex, more distinctly separated on face laterally and below; scutum densely and rather uniformly rugoso-punctate, scutellum and pleura below somewhat more coarsely and distinctly punctate, becoming more closely crowded on pleura above; propodeum rather closely and finely punctate, lateral faces below becoming smooth and somewhat shining, triangle impunctate, dull and densely tessellate, becoming somewhat striate along upper margin; abdominal terga very finely and closely but deeply and distinctly punctate throughout, the punctures becoming inevident at base of tergum 1, somewhat more coarse and sparse on tergum 5, only the very narrow apical rims of each impunctate; pseudopygidium transverse, very short, forming the truncate apical margin of tergum 5, covered with very dense, pale, suberect tomentum; pubescence extremely short, thin and obscure, hardly evident, entirely pale where visible; sternum 5 apically with a conspicuous tuft of elongate, yellowish hairs on each side.

MALE—Length 9-11 mm.; lateral ocelli

slightly nearer margin of vertex than to each other; cheeks slightly more than half width of eyes, posterior margin rounded; antennal scape bulbous, length only slightly exceeding the maximum breadth, apex only slightly excavated, fully exposing pedicel, shorter side of basal segment of flagellum slightly longer than segment 2, following segments fully as broad as long; mandibles robust, entirely simple; wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining between deep, distinct and rather close punctures throughout; posterior margin of scutellum narrowly and slightly grooved medially; anterior coxae not spinose; hind femora unmodified; apex of hind tibiae with a row of 5 or 6 rather short but robust, testaceous bristles; labrum, basal half of mandibles, entire face below antennae, and a narrow band completely encircling eyes, bright yellow, a small yellow spot just below anterior ocellus; otherwise upper part of face, vertex and cheeks black; scape yellow anteriorly, becoming testaceous posteriorly, flagellum largely testaceous, more or less piceous above toward apex; pronotal collar, tubercles, tegulae, scutellum, adjacent median area of metanotum, two large maculations on propodeum, a large anterior maculation on mesopleura, and all coxae, bright yellow; scutum narrowly ferruginous on each side, thorax otherwise black; trochanters and femora in general testaceous, the femora more or less yellowish anteriorly, tibiae and tarsi yellow, hind tibiae more or less testaceous over apical two thirds, spurs pale yellow; abdominal terga 1-6 with entire, transverse, broad, submedian, yellow bands, these slightly narrowed medially on 1-3, quite uniformly wide on 4 and 5, more restricted on 6; sterna 2-4 with more or less conspicuous, basal, yellow bands that are considerably narrowed at mid-line, 5 with a small, submedian, yellow maculation; sterna otherwise yellow-hyaline apically, more or less darkened between these areas and the maculations; punctures quite close, deep and distinct over entire head, somewhat finer on cheeks, somewhat more sparse on each side of clypeus below, those on clypeus medially rather coarse, very close and irregular; scutum densely and rather finely rugoso-punctate; pleura below very coarsely and distinctly punctate, punctures becoming slightly closer above; propodeum rather closely and deeply punctate, lower margin laterally becoming shining and impunctate, the triangle impunctate but dull and tessellate, becoming very finely and irregularly rugoso-striate along upper margin; abdominal terga deeply and distinctly but very finely and closely punctate throughout, punctures becoming inevident at base of tergum 1, somewhat coarser and more widely separated on the more apical terga, only the very narrow apical rims impunctate; pubescence extremely short, thin and inconspicuous, pale yellowish where visible; basal width of pygidial plate (fig. 104) about equal to median length, strongly narrowed apically to the narrowly rounded apex, margins carinate, surface very finely and shallowly punctate; sternum 6 quite broadly rounded, rather deeply and closely punctate, at least toward base; sternum 8 (fig. 104) with an elongate, slender, apical process, with a few robust setae at tip; gonocoxites of genital armature (fig. 103) broad at base but not lobate, gonostyli slender and elongate, thinly short pubescent, somewhat produced on inner side at base but not tufted.

DISTRIBUTION—Kansas and Nebraska, east to North Carolina, July to September.

FLOWER RECORDS—*Bidens*. Recorded by Robertson (1929) on *Aster* and *Helianthus*.

Recognition of another form of this species, *heterochroa* Cockerell, from Colorado makes the subspecific designation of this typical form of *vincta* necessary.

Nomada (Heminomada) annulata Smith

(Figs. 103 & 104)

Nomada annulata Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 248. ♀. (♂ misdet)

Nomada annulata Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 311.

FEMALE—Length 8-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin subcarinate above; shorter side of basal segment of flagellum fully equal to segment 2, median segments slightly longer than broad; mandibles unusually robust, quite strongly flattened, outer margins strongly bowed, almost angular, inner margin relatively straight; wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd quite broad anteriorly, 3rd very strongly narrowed, veins testaceous, basal vein slightly basad of transverse median, almost interstitial; tegulae shining between deep, distinct, rather coarse punctures which are close anteriorly, slightly more sparse posteriorly; posterior margin of scutellum only very faintly impressed medially, if at all; front coxae not spinose; apex of hind tibiae with a pair of short but robust, reddish bristles; clypeus, supraclypeal area,

lateral facial maculae extending completely around eyes, and a small spot below anterior ocellus, bright yellow; labrum somewhat more yellowish-testaceous, mandibles and antennal scape testaceous, flagellum more brownish-testaceous; pronotal collar, tubercles, tegulae, scutellum, adjacent median area of metanotum narrowly, lateral margins of scutum and adjacent axillae, and usually a pair of narrow, submedian lines, an anterior and a dorsal maculation on mesopleura, and a pair of broad maculations on propodeum, bright yellow; mesopleura above largely ferruginous posterior to and beneath the yellow maculae; coxae with small yellow maculae, but otherwise testaceous, trochanters and femora testaceous in large part, tibiae largely yellow, hind pair somewhat testaceous apically; front and middle basitarsi yellowish, the more apical tarsal segments and hind tarsi entirely, more testaceous, spurs pale yellowish; abdominal terga 1-5 with entire, broad, transverse, yellow bands, that on tergum 1 submedian and rather narrow, those on 2 and 3 sub-basal, sometimes interrupted medially by a broad ferruginous area on 2, those on 4 and 5 subapical; impressed apical margins more ferruginous on 4 and 5, piceous on 1-3, and base of 1 piceous; sterna 2-5 with more or less extensive, transverse, basal, yellow areas, apical margins rather broadly and obscurely brownish-hyaline; punctures close, deep and distinct over most of head, coarsely so above antennae and at sides of face below, more finely so on cheeks and vertex, the supraclypeal area and clypeus laterally with coarse and deep punctures, these becoming very fine and rather obscure on clypeus medially; scutum quite coarsely and densely rugoso-punctate, scutellum with rather sparse, coarse and deep punctures, pleura very coarsely, deeply and quite closely punctate below, but with some shining interspaces evident, becoming densely crowded above; propodeum rather finely rugoso-punctate, triangle irregularly striate, rather coarsely so along upper margin; discs of abdominal terga with rather deep, distinct, fine and slightly separated punctures, apical rims becoming narrowly impunctate, punctures extremely minute on tergum 1 but still quite close basally, those on 4 and 5 relatively coarse and well separated toward the apical impressed margins which are more or less reddish; pseudopygidium transverse, median length almost half the breadth, forming the apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short and thin but rather copious over head and thorax, yellowish above, somewhat more whitish below, barely evident on abdomen dorsally, more elongate and very thin on sternal plates, sternum 5 with apical tufts of elongate, yellowish hairs on each side of mid-line, these converging medially.

MALE—Length 6.5-9.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks more than half width of eyes, posterior margin carinate above; antennal scape strongly swollen, apex rather deeply excavated, partially enclosing pedicel, shorter side of basal segment of flagellum fully equal to segment 2, median segments very slightly longer than broad; mandibles robust, somewhat flattened, outer margins slightly angulate, inner margin nearly straight; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins yellowish, basal vein very slightly basad of transverse median; tegulae shining between fine but quite deep and distinct, rather close punctures, these becoming more sparse posteriorly; posterior margin of scutellum very slightly grooved medially; front coxae not spinose; hind femora slender and simple; face below antennae yellow except for some blackened areas just below each antennal fossa, the lateral facial maculae extending very narrowly to top of eye; cheeks below narrowly yellow along eye margin; antennal scape yellow anteriorly, black posteriorly, flagellum brownish-testaceous; pronotal collar in part, tubercles, tegulae, transverse maculations on scutellum, and a rather small anterior maculation on mesopleura, bright yellow, thorax otherwise black; legs chiefly bright yellow, but femora more or less testaceous to piceous on posterior face, and hind coxae black; spurs pale yellow; abdominal terga 1-6 with entire, transverse, yellow bands, that on 1 submedian and rather narrow, that on 2 sub-basal, very broad laterally, slightly narrowed medially, those on 3 and 4 sub-basal, more nearly apical on 5 and 6, apical margins more or less yellowish-hyaline on the more apical terga; abdominal sterna 2-6 largely bright yellow, apical margins broadly yellowish-hyaline; punctures very coarse, deep and close on face above antennae, becoming somewhat finer but still very close on vertex laterally and on cheeks, much finer and very close below antennae, very fine and distinct on clypeus; entire thorax densely rugoso-punctate, the pleura very coarsely so below, punctures of scutellum somewhat more distinct, propodeal triangle impunctate but rather finely and irregularly substriate; abdominal terga very finely and rather closely punctate, tergum 1 very minutely so, becoming impunctate toward base; punctures of the more apical terga becoming somewhat more coarse and distinctly separated, apical rims very narrowly impunctate; pubescence pale yellowish, short and thin but rather copious over head and thorax, hardly evident

on abdomen dorsally, more elongate but very thin and sparse on abdominal sterna; sternum 6 quite densely fringed on each side with elongate yellowish hairs, the apical pubescence erect and quite dense; basal width of pygidial plate about equal to median length, quite strongly narrowed apically to the narrowly but deeply incised tip, margins carinate, surface very finely and closely punctate; sternum 6 triangular; sternum 8 and gonocoxites of genital armature as shown (figs. 103 & 104).

DISTRIBUTION—North Carolina, April and May.

FLOWER RECORDS—*Claytonia, Rubus* and *Senecio.*

HOST—*Andrena macra* Mitchell.

Nomada (?Heminomada) autumnalis new species

MALE—Length 8 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; antennal scape quite strongly swollen, apex deeply excavated, partially enclosing pedicel, longer side of basal segment of flagellum equal to segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings hyaline, only the rather narrow apical margin and marginal cell lightly infuscated, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining between rather fine punctures, these close over anterior half, becoming sparse posteriorly; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; hind femora slender and simple; lower half of face largely yellow, but broadly black laterad of bases of antennae and reaching the supraclypeal area, the lateral facial maculations extending very narrowly to top of eye, and cheeks very narrowly yellow along posterior orbits nearly to top; vertex, cheeks and upper part of face black; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum more reddish-testaceous; thorax largely black, with only the tubercles and a small anterior maculation on mesopeura, yellow; coxae black in large part, becoming yellowish apically, trochanters more testaceous; front and mid femora testaceous posteriorly, yellowish anteriorly, the tibiae largely yellow with some testaceous infusions, and tarsi entirely yellow; hind femora piceous posteriorly, more testaceous anteriorly, apex yellow, hind tibiae yellow at base, otherwise more testaceous, and tarsi testaceous; spurs pale yellow; abdominal terga 2 and 3 with broad, transverse, submedian, yellow bands that are somewhat narrowed medially, 4-6 with more apical, yellow bands separated from apical rims only by the impressed apical margin; tergum 1 with a pair of transverse, more lateral maculations that are slightly separated medially by a testaceous zone, 1-3 piceous basally and apically, 4-6 becoming more brownish or testaceous apically; discs of abdominal sterna 2-6 largely yellow, the impressed apical areas more testaceous, becoming yellowish-hyaline along the rims; sternum 1 with a very small, median, yellow spot; vertex and face above antennae quite coarsely rugose, cheeks becoming somewhat more finely rugoso-punctate, lower part of face more distinctly but finely punctate, the supraclypeal area and clypeus with minute, close and very vague punctures; scutum and scutellum densely rugose, mesopleura somewhat more coarsely rugoso-punctate; propodeum posteriorly more shallowly rugoso-punctate, lateral faces becoming rather smooth below and along margin of metapleura; punctures of abdominal terga 2-6 very fine and close, becoming somewhat more distinctly separated apically, especially on the more apical terga, very minute medially on basal tergum, becoming impunctate laterally and basally; pubescence entirely pale, quite copious over head and thorax but not hiding surface, very fine, short and obscure on abdominal terga, but the more apical hairs becoming more elongate; sternal plates with more elongate, sparse, fine hairs, these becoming rather dense on apex of sternum 6; median length of pygidial plate about equal to basal width, somewhat narrowed apically, apex rather deeply incised, margins strongly carinate, surface rather closely and shallowly punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed apically, subtriangular; sternum 8 with a slender apical process; gonocoxites of genital armature much as in *denticulata* (fig. 107).

TYPE—Holotype: Male, Oakland Co., Mich. Sept. 23, 1923. (A. W. Andrews) [author's coll.].

Nomada (Heminomada) bethunei Cockerell

(Fig. 105)

Nomada bethunei Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 607. ♂.

MALE—Length 9-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes, posterior margin strongly carinate; antennal scape quite strongly swollen, apex deeply excavated and completely enclosing pedicel,

basal segment of flagellum very short, the shorter side less than half length of segment 2, median segments somewhat longer than broad; mandibles rather robust, simple; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae shining between very close, deep and distinct punctures; posterior margin of scutellum deeply grooved; front coxae not spinose; hind femora slender and unmodified; face below antennae largely yellow, with only a small amount of red below each antenna and between the yellow supraclypeal area and lateral face marks, these ending rather abruptly at level of antennae; face otherwise chiefly ferruginous, with a small amount of black just above supraclypeal area and between ocelli; posterior margin of cheeks rather narrowly black; antennal scape bright yellow anteriorly, more ferruginous on inner and posterior sides, flagellum brownish-testaceous; thorax red in large part, the pronotal collar narrowly, tubercles, an anterior maculation on mesopleura, and a small lateral maculation on each side of posterior face of propodeum, yellow; tegulae more testaceous; metapleura and lateral faces of propodeum black, and a small amount of black medially on venter of thorax; legs largely reddish-testaceous, the front coxae, trochanters, femora and tibiae quite definitely yellow anteriorly, a small amount of yellow on mid coxae beneath and hind coxae laterally; spurs pale yellow; basal abdominal tergum largely dark, with a transverse, more or less ferruginous, submedian band which becomes yellowish laterally, the basal and apical margins fuscous; terga 2-6 with broad, transverse, entire, yellow bands, these more basal, very broad laterally and somewhat narrowed medially on 2-4, subapical on 5 and 6; discs of abdominal sterna 3-6 with considerable yellow, the broadly impunctate and depressed apical margins testaceous-hyaline; punctures of face coarse, close, deep and distinct, those on vertex somewhat more crowded, becoming rather fine but densely crowded on cheeks below, supraclypeal area and clypeus very finely and obscurely punctate, very sparsely so on each side of clypeus just above mandibles; scutum, mesopleura and scutellum coarsely and deeply rugoso-punctate, the propodeum posteriorly somewhat more finely and more shallowly rugose, lateral faces more or less rugoso-striate below, more coarsely rugose above; discs of abdominal terga minutely and quite closely punctate, basal tergum becoming impunctate laterally and basally, punctures on the following terga becoming somewhat more widely separated on the apically impressed areas, somewhat coarsely so on the more apical terga, only the very narrow rims entirely impunctate; pubescence very short and thin, entirely pale, whitish, quite copious on head and thorax below, becoming somewhat shorter and more yellowish above, very short and inconspicuous on abdomen dorsally, very sparse and thin on the sterna; sternum 6 densely clothed toward apex with rather elongate, erect, pale pubescence; median length of pygidial plate subequal to basal width, rather strongly narrowed apically, the tip deeply incised, margins carinate, surface rather coarsely but shallowly punctate; exposed sternal plates unmodified; sternum 6 quite strongly narrowed apically; sternum 8 much as in *annulata* (fig. 104); gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION — Michigan and Ohio, May to July.

Nomada (Heminomada) bishoppi Cockerell new combination

(Fig. 105)

Nomada (Xanthidium) luteola bishoppi Cockerell, 1911. U. S. Natl. Mus. Proc. 39, p. 655. ♀.

Nomada (Heminomada) luteoloides bishoppi Swenk, 1915. Univ. Nebr. Stud. 15, p. 169.

FEMALE—Length 9.5-12 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, posterior margin strongly carinate; longer side of basal segment of flagellum about equal to segment 2, median segments somewhat longer than broad; mandibles rather robust, simple apically; wings hyaline basally, becoming somewhat yellowish apically, with the usual three submarginal cells, 2nd not much longer than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct and rather coarse punctures which are close anteriorly, somewhat sparse posteriorly; posterior margin of scutellum quite deeply grooved, upper surface smooth and shining between coarse, deep, distinct and rather sparse punctures; front coxae not spinose; apex of hind tibiae with a pair of short, triangular, robust processes which form a quite deep emarginate area; cheeks anteriorly and lower half of face below antennae entirely yellow, eyes thus nearly surrounded by yellow; cheeks posteriorly, space between ocelli, and limited areas above antennae, black; vertex and face just below ocelli ferruginous; antennal scape more testaceous, flagellum brownish-testaceous; pronotal collar, tubercles,

tegulae in large part, scutellum, axillae, lateral margins and a pair of narrow submedian lines on scutum, posterior face of propodeum except mid-line, and an extensive transverse area on mesopleura, bright yellow; scutum medially, anterior margin of scutellum, a median stripe and lateral faces of propodeum, and metapleura, black; scutum largely ferruginous between median and lateral yellow lines, mesopleura above with a small yellow maculation just below wing bases, and venter of thorax dark ferruginous with blackish infusions; coxae, trochanters and femora largely ferruginous, but narrowly yellow apically, tibiae yellow at base and apex, these maculations to some degree connected on front and mid legs, tarsi more testaceous, spurs pale yellow; abdominal terga 1-5 with broad, entire, yellow bands, these occupying nearly the entire disc of 2-5, that on 1 submedian and subinterrupted medially; abdominal sterna 2-5 yellow in large part, only the broad, depressed, subhyaline, apical margins more reddish, basal sternum with yellowish infusions medially, otherwise red; punctures coarse, close and deep over most of face and vertex, finer on cheeks, supraclypeal area and clypeus, very sparse between clypeus laterally and lower margin of eyes; scutum coarsely rugoso-punctate medially, becoming much more finely so laterally, posterior median area more distinctly punctate; upper face of scutellum very coarsely and rather sparsely punctate, surface shining; mesopleura rather densely and finely rugoso-punctate below, becoming more distinctly and coarsely punctate above, the punctures quite sparse anteriorly; propodeum posteriorly quite finely and obscurely rugose, lateral faces somewhat smoother below, rather coarsely rugose above, triangle rather smooth below, becoming quite coarsely striate along upper margin; discs of abdominal terga very finely and closely but quite distinctly punctate throughout, only basal tergum becoming impunctate laterally and basally, apical margins of terga becoming narrowly impunctate, pseudopygidium transverse, very short, forming a rather broad, truncate, apical margin on tergum 5, densely covered with suberect, silvery tomentum, the more apical punctures of terga 4 and 5 becoming quite sparse; pubescence very short, thin and obscure, entirely pale, somewhat yellowish above, hardly evident on abdomen dorsally, sterna with sparse elongate hairs overlying in part the broad depressed apical margins; sternum 5 apically with a dense tuft of elongate, curved, brownish hairs which converge medially.

MALE—Length 8.5-11.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated, nearly or quite enclosing pedicel, longer side of basal segment of flagellum fully equal to segment 2, the more apical segments slightly longer than broad; mandibles quite slender and simple apically; wings subhyaline basally, becoming faintly infuscated or yellowish apically, with the usual three submarginal cells, 2nd not much broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct, close and rather coarse punctures; posterior margin of scutellum rather deeply grooved medially; front coxae not spinose; hind femora slender and simple; face below antennae largely yellowish, but with some invasion of black on each side of supraclypeal area below antennae, the lateral maculae extending narrowly to top of eyes and posterior margin of eye narrowly bordered with yellow nearly to the top; remainder of face, vertex and cheeks black; scape bright yellow anteriorly, flagellum more testaceous beneath, somewhat darker brown above; pronotal collar, tubercles, tegulae, a pair of small maculations on scutellum and on propodeum posteriorly, and a rather small anterior maculation on mesopleura, bright yellow; thorax otherwise black; front coxae largely yellow, mid and hind pair yellow in part, front legs entirely yellow except for posterior faces of femora and tibiae which are reddish to piceous in part, mid and hind legs more testaceous, the mid femora and tibiae yellow anteriorly and to some degree at base and apex posteriorly, hind femora yellow apically, tibiae yellow at base and apex anteriorly, posterior surfaces of these two segments piceous; all tarsi yellowish to testaceous, spurs pale yellow; abdominal terga 1-6 with broad, entire, yellow bands, tergum 1 piceous to black basally, apical depressed areas of all terga somewhat reddish, becoming narrowly yellowish-hyaline along rims; abdominal sterna yellow in large part, basal sternum with a yellow central blotch, otherwise more reddish; face above antennae quite coarsely rugoso-punctate, becoming somewhat more finely so on vertex and cheeks, the yellow lower part of face rather shallowly and vaguely finely rugose on each side, supraclypeal area and clypeus more distinctly but very finely punctate, lateral areas of face between clypeus and lower end of eye shining and largely impunctate; scutum, scutellum and pleura quite densely rugose, only the maculated areas of scutellum with distinctly separated, coarse punctures; propodeum more finely and obscurely rugose, becoming somewhat smooth and shining on each side below, triangle dull and densely tessellate below, becoming irregularly and rather finely striate

along upper margin; discs of abdominal terga very finely, closely, deeply and distinctly punctate, punctures becoming somewhat more coarse and sparse on terga 4-6 apically; basal tergum becoming impunctate laterally and basally; pubescence pale yellowish, short but quite dense, erect and conspicuous on head and thorax, very fine and obscure on abdomen dorsally, more elongate and sparse on sternal plates, sternum 6 with quite dense, more erect pubescence apically; median length of pygidial plate about equal to basal width, quite strongly narrowed apically, apex slightly incised medially, margins carinate, surface rather closely and finely punctate; exposed sternal plates unmodified; sternum 6 subtriangular, apex rather narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Minnesota to Maine, south to Mississippi and Florida, March to June.

FLOWER RECORDS—*Aronia, Brassica, Claytonia, Crataegus, Rubus, Senecio* and *Viburnum.*

Nomada (Heminomada) capitalis new species

FEMALE—Length 8 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, posterior margin strongly carinate; longer side of basal segment of flagellum fully equal to segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming rather lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae somewhat shining between deep, distinct punctures, these quite close anteriorly, becoming rather sparse posteriorly; posterior margin of scutellum slightly impressed medially; front coxae not spinose; apex of hind tibiae quite deeply emarginate between a pair of robust, triangular tubercles; face below level of antennae largely yellow, but supraclypeal area and clypeus sometimes more testaceous or ferruginous, lateral face marks ending narrowly near top of eye; face above vertex, and cheeks in part, ferruginous, a limited area above each antenna and another between ocelli, black; cheeks narrowly black posteriorly, yellow along margin of eye, intermediate area above more or less ferruginous; antennal scape yellowish-testaceous anteriorly, flagellum somewhat more brownish-testaceous; pronotal collar, tubercles, tegulae in part, scutellum above, restricted median area on metanotum beneath, two large posterior maculations of propodeum, and a limited anterior area of mesopleura, bright yellow; tegulae yellow, becoming more testaceous posteriorly; scutum with a median black line and some blackish infusions on each side anteriorly; metapleura, adjacent lateral faces of propodeum, and a median area of posterior face, black; otherwise scutum and mesopleura more ferruginous; legs testaceous in large part but front coxae somewhat yellowish apically, and apex of femora narrowly yellowish, tibiae yellow at base and apex, tarsi more testaceous, spurs pale yellow; abdominal terga 1-5 with broad, entire, yellow bands, that on 1 submedian, subinterrupted medially, those on 2-4 median, that on 5 covering most of apical half of disc, the broad, apical, impressed margins somewhat reddish, basal tergum more piceous; discs of abdominal sterna 3-5 largely yellow, apical margins broadly testaceous-hyaline, sternum 1 with a limited median yellow area, and 2 with small, yellow areas on each side; head in large part coarsely, deeply, and very closely punctate, almost rugose above antennae, somewhat more finely and definitely rugose on cheeks below, each side of face below antennae quite distinctly and rather sparsely punctate, supraclypeal area and clypeus medially, more finely and closely punctate, becoming more sparsely and coarsely so laterally; scutum densely rugoso-punctate, rather finely so at each side, mesopleura very coarsely rugoso-punctate, scutellum shining between coarse, deep and well separated punctures; propodeum rather finely and shallowly rugose posteriorly, lateral faces becoming somewhat smoother, disc rather smooth but dull below, becoming irregularly rugoso-striate along upper margins; discs of abdominal terga very finely, closely and quite regularly punctate, punctures becoming slightly more sparse apically, rather coarse toward apex on 4 and 5, basal tergum becoming nearly impunctate laterally and basally; pseudopygidium transverse, very narrow, forming a rather narrow, truncate, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short, thin and sparse, somewhat more elongate and copious on head below and on thorax beneath, largely pale yellow where evident, hardly visible on abdomen dorsally, the sterna with sparse but more elongate, pale yellowish hairs; sternum 5 apically with sublateral tufts of elongate curved hairs which converge medially.

TYPES — Holotype: Female, Raleigh, N. C., April 5, 1935 (H. F. Schoof) [author's coll.]. Paratypes: 1 ♀, Univ. Tenn. Farm, Knoxville, Tenn., May 5, 1951 (A. C.

Cole); 1 ♀, Livingston Co., Mich., May 28, 1944 (R. R. Dreisbach); 1 ♀, Antrim, N. H., June 11, 1932 (C. A. Frost).

Paratypes are in collections of the University of Tennessee, R. R. Dreisbach and Museum of Comparative Zoology.

Nomada (Heminomada) colorata new species

FEMALE—Length 10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming very faintly infuscated apically, with the usual three submarginal cells, 2nd very much broader than 3rd anteriorly, 3rd very short, veins testaceous to piceous, basal vein slightly basad of transverse median; tegulae somewhat shining between deep, distinct, rather fine punctures, these close anteriorly, becoming quite sparse posteriorly; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; apex of hind tibiae with a pair of very short but rather robust, triangular tubercles delimiting a median emarginate area; face largely yellow below level of antennae, but with a limited black area laterad of supraclypeal area just beneath antennae, lateral maculae extending rather broadly to top of eyes, and cheeks rather broadly yellow anteriorly nearly to top of eyes, these two marginal maculated areas not quite meeting; otherwise face above antennae, entire vertex and posterior half of cheeks, black; antennal scape yellowish-testaceous anteriorly, flagellum more reddish-testaceous beneath, piceous above; pronotal collar, tubercles, tegulae, scutellum in large part, median adjacent area of metanotum, a pair of large maculae on each side of propodeum posteriorly, and a large anterior maculation on pleura, bright yellow; pleura posteriorly and below more ferruginous, black above but with a rounded yellow spot beneath tegulae which is yellowish-ferruginous; scutum, metapleura, lateral faces of propodeum, propodeal triangle and median area below, entirely black; front coxae yellowish in part, trochanters testaceous, femora testaceous, becoming yellow apically, tibiae and tarsi yellow, somewhat infused with testaceous posteriorly; middle and hind legs largely testaceous basally, femora tipped with yellow, trochanters yellow in large part anteriorly, more or less testaceous posteriorly, mid tarsi yellow, hind tarsi testaceous, spurs pale yellow; abdominal terga 1-5 with broad, transverse yellow bands, these submedian on 1-4, somewhat interrupted medially on tergum 1 which is piceous at base and apex, tergum 2 piceous at base, the broad apical margins of 2-4 more ferruginous, somewhat more piceous on 4, tergum 5 almost entirely yellowish; sterna 2-5 largely yellow, only the broad apical margins becoming somewhat more testaceous-hyaline, basal sternum with a very small, median, yellow blotch; head coarsely and closely punctate in general, punctures becoming somewhat finer and closer on cheeks below, coarse and well separated on each side of face below, very fine and close on supraclypeal area and on clypeus medially, becoming rather sparse at extreme sides; scutum densely rugoso-punctate, rather finely so on each side, the mesopleura quite coarsely rugoso-punctate, scutellum shining between coarse, deep and sparse punctures, propodeum rather finely rugose, becoming somewhat smoother on lateral faces below; discs of abdominal terga deeply and distinctly but very finely and closely punctate throughout, basal tergum becoming minutely punctate laterally and basally, the punctures hardly evident, and punctures becoming somewhat more coarse and sparse apically on tergum 5; pseudopygidium transverse, quite short, forming a rather short, truncate, apical margin of tergum 5, densely covered with suberect silvery tomentum; pubescence short, rather copious on head and thorax, largely pale yellow, hardly evident on abdomen dorsally, the sterna with more elongate and sparse pale hairs, sternum 5 with a pair of apical tufts of elongate, curved, yellowish hairs on each side of midline that tend to converge medially.

TYPES—Holotype: Female, Sanilac Co., Mich., Aug. 7, 1926 [author's coll]. Paratypes: 1 ♀, Ann Arbor, Washtenaw Co., Mich., May 1, 1937 (D. L. Cantrall) [Hubbell]; 1 ♀, Ithaca, N. Y., May 4, 1937 (W. B. St. John) [Snelling].

Nomada (Heminomada) dentariae (Robertson)

(Fig. 105)

Xanthidium dentariae Robertson, 1903. Canad. Ent. 35, p. 178. ♂.

Xanthidium dentariae Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin becoming carinate above; longer side of basal segment of flagellum slightly shorter than segment 2; mandibles rather robust, simple apically; wings

subhyaline basally, becoming lightly infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct and rather close punctures; posterior margin of scutellum deeply grooved medially; front coxae not spinose; apex of hind tibiae with one or two rather slender and elongate, yellowish bristles; head chiefly yellow, with a limited black area just above antennae, ocelli enclosed in an ovoid, blackened area, and posterior half of cheeks black; antennal scape yellow anteriorly, more reddish-testaceous posteriorly, flagellum more brownish-testaceous thorax largely red or yellow (possible discoloration due to cyanide); prothorax laterally, a limited area on mesopleura below, metapleura, adjacent lateral faces of propodeum, posterior face of propodeum medially, mid and hind coxae in large part, and a median line on scutum, black; tubercles and tegulae pale yellowish; femora largely testaceous, but all coxae more yellowish beneath, trochanters, tibiae and tarsi largely yellow, the spurs pale yellow; abdominal terga 1-5 with rather broad, transverse, submedian, yellow or ferruginous bands, these occupying most of discs of 2-4; apical impressed areas broad and piceous, reddish on the more apical terga; abdominal sterna 2-5 largely yellow basally, the broadly impressed, apical margins more reddish, basal sternum with a median yellow blotch; punctures coarse, close, deep and distinct over most of head, becoming slightly finer on cheeks below, very fine and close on supraclypeal area and clypeus; scutum, scutellum, mesopleura and propodeum coarsely and quite densely rugoso-punctate, rather shallowly on propodeum, becoming quite finely so on lateral faces below; discs of abdominal terga 2-4 very finely, closely and quite distinctly punctate basally, punctures becoming more minute and somewhat more widely separated toward apical margins, very minute and rather close on basal tergum medially, becoming impunctate laterally and basally; tergum 5 finely and closely punctate basally, more coarsely and sparsely so apically; pseudopygidium transverse, very short, forming the quite broad, apical margin of tergum 5, densely covered with erect, pale yellowish or whitish tomentum; pubescence very short and thin but fairly copious on head and thorax, whitish below, more yellowish above, barely visible over most of abdomen, with some longer sparse hairs on the sternal plates; apex of sternum 5 with dense lateral tufts of elongate, curved, more or less fuscous hairs which converge medially.

MALE—Length 9.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin rounded; antennal scape much swollen, apex deeply excavated and entirely enclosing the pedicel, basal flagellar segment very short, the longer side much shorter than segment 2 which is fully twice as long as broad, median segments somewhat less elongate; mandibles quite robust, simple apically; wings hyaline basally, becoming faintly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins testaceous to brownish, basal vein much basad of transverse median; tegulae shining between deep, distinct and quite close punctures; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; hind femora slender and simple; clypeus, a small spot on supraclypeal area, narrow lateral facial maculae terminating at level of antennae on margin of eye, labrum, mandibles except tips, and lower end of cheeks on eye margin, bright yellow, head otherwise black; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; pronotal collar, tubercles, tegulae, two large maculations on scutellum, and a rather large anterior maculation on mesopleura, bright yellow, thorax otherwise black; front and hind coxae black in large part, legs otherwise largely testaceous, but hind femora more piceous beneath, all tibiae more or less yellow at base and apex, and tarsal segments yellow basally, becoming somewhat reddened apically, spurs pale yellow; abdominal terga 1-6 with broad, basal, yellow bands, that on tergum 1 more median and narrowly interrupted medially, occupying most of discs on 2-6, apical impressed areas more reddish; abdominal sterna 2-6 more or less broadly yellowish across discs, the broad, apical, impressed areas more ferruginous-hyaline, basal sternum with a median yellow blotch, and sternum 6 largely yellow; punctures coarse, deep, distinct and close over most of face and cheeks, coarse just below antennae, very fine, obscure and rather close on maculated areas above and on clypeus, very sparse on lower anterior orbits; scutum, scutellum and mesopleura quite densely and rather coarsely rugoso-punctate, propodeum more shallowly rugoso-punctate posteriorly, becoming much more finely so laterally and more or less shining along lower anterior margin, triangle rather smooth and impunctate below, becoming quite coarsely and irregularly rugoso-striate along upper margin; pubescence short and thin but quite copious over most of head and thorax, whitish below, somewhat tinged with yellow above, barely visible on abdominal terga, the sterna with some more elongate, sparse hairs, only tergum 6 rather densely

pubescent apically; basal width of pygidial plate about equal to median length, strongly narrowed apically, tip deeply incised, margins carinate, surface covered with fine, slightly separated punctures; abdominal sterna but little modified, sternum 6 triangularly acute apically, tip quite densely covered with erect, fine, yellowish hairs; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Illinois to New York, south to the Great Smokies National Park (Tennessee or North Carolina), April and May.

FLOWER RECORDS—Robertson (1929) records *dentariae* on *Dentaria, Erythronium, Mertensia* and *Salix*.

The description above of the female of this species is based on a specimen collected with a male in the Great Smokies National Park and received from R. R. Dreisbach.

Nomada (Heminomada) electa Cresson

(Fig. 105)

Nomada electa Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 290. ♀ ♂.

Nomada (Xanthidium?) mimula Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 66. ♀. New synonymy

FEMALE—Length 9.5 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin strongly carinate; longer side of basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings yellowish-hyaline, rather deeply so apically, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae unusually broad and expansive, somewhat shining between deep, distinct, rather coarse and slightly separated punctures; posterior margin of scutellum faintly impressed medially; front coxae not spinose; apex of hind tibiae with a row of very short but rather robust reddish bristles; clypeus, labrum, mandibles except tips, and broad lateral facial maculae, bright yellow; supraclypeal area, face above antennae, vertex, and cheeks, black; cheeks narrowly yellow along eye margin below, and a small yellow spot on eye margin above; facial maculae quite abruptly truncate on eye margin just above antennae; antennal scape yellow anteriorly, more piceous posteriorly, flagellum brownish-testaceous basally, become more piceous apically; pronotal collar, tubercles, adjacent anterior angle of scutum, scutellum except anterior margin, and adjacent median area of metanotum, bright yellow; mesopleura with a transverse yellow band which is margined above and below with ferruginous; coxae more or less black, trochanters and femora brownish-testaceous, tibiae yellow at least at base and apex, more or less testaceous medially, tarsi largely testaceous, tibial spurs pale yellow; abdominal terga 1-5 with conspicuous, transverse, yellow bands, that on tergum 1 submedian, slightly interrupted medially and rather sinuous; bands on terga 2-4 very broad laterally, becoming much narrowed medially, and subinterrupted on 2 and 3, that on 4 of more uniform width although subinterrupted at each extreme side, and that on 5 apical, very broad medially, subinterrupted on each side; abdominal sterna 3 and 4 with more or less transverse yellow bands, sterna otherwise quite dark; punctures of face above, vertex and cheeks coarse, close and deep, becoming rugose in part, lateral punctures below antennae fine and rather close, fine and densely crowded on supraclypeal area, and somewhat more distinct but fine and quite close on clypeus; scutum and mesopleura coarsely and very densely rugoso-punctate, pleural punctures rather coarse but distinct, to some degree separated; propodeum posteriorly very finely and closely rugoso-punctate below, triangle dull and tessellate but rather smooth below, becoming very irregularly rugoso-punctate along upper margin, lateral faces above spiracle more coarsely rugose, somewhat smoother below; discs of abdominal terga 2-5 very fine, close, deep and distinct across base, becoming somewhat more coarse and distinct apically, basal tergum quite distinctly punctate apically, but becoming impunctate laterally and basally, the more apical terga with somewhat deeper, more distinct and coarse punctures before apical rims; pseudopygidium short and transverse, forming the narrow apical margin of tergum 5, densely covered with suberect, silvery or yellowish tomentum; pubescence extremely short, thin and obscure, entirely pale where visible, apex of sternum 5 with a pair of tufts of elongate hairs which converge medially.

MALE—Length 8.5-9.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin carinate; antennal scape slightly swollen, apex deeply excavated and largely enclosing pedicel, basal segment of flagellum much shorter than segment 2, the shorter side not much greater than apical width, median segments somewhat longer than broad; mandibles slender and simple apically; wings yellowish-hyaline, somewhat more deep-

ly so apically, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae unusually broad and expansive, shining between deep, distinct, quite coarse and rather close punctures; posterior margin of scutellum slightly impressed medially; front coxae not spinose; hind femora slender and simple; clypeus, labrum, basal half of mandibles, narrow lateral facial maculae, and cheeks below adjacent to eye, bright yellow; head otherwise black, the facial maculae ending rather narrowly on eye margin at level of antennae; antennal scape yellow anteriorly, flagellum more brownish-testaceous; pronotal collar narrowly, tubercles, tegulae, usually a pair of maculae on scutellum, and a small anterior maculation on mesopleura, bright yellow, thorax otherwise black; front and hind coxae black, legs otherwise chiefly testaceous but front tibiae yellow anteriorly, mid and hind tibiae yellow at base and apex, narrowly connected on hind pair by a yellow line; spurs pale yellow; abdominal terga 1-6 with conspicuous, yellow maculations, submedian, rather narrow, and interrupted medially on tergum 1, more widely interrupted on 2 and 3, submedian, broad laterally, accuminate toward mid-line, transverse and entire on 4-6, considerably separated from margin on 4, subinterrupted on each side on 4 and 5; abdominal sterna with small lateral maculations on 3, a median maculation on 4, and small yellow spots at extreme sides of sterna 2-5; punctures coarse, close, deep and distinct on face above antennae, on vertex and on cheeks, quite coarse on each side of face below antennae, somewhat finer and closer on supraclypeal area and clypeus; scutum, scutellum and mesopleura coarsely rugoso-punctate throughout; propodeum somewhat more finely rugose posteriorly, triangle densely tessellate and dull, becoming irregularly rugoso-striate along upper margin; punctures becoming somewhat more sparse toward mid coxae laterally, somewhat coarser above spiracle; discs of abdominal terga 2-5 deeply, distinctly, finely and closely punctate across base, those on tergum 1 deep, distinct and close, becoming minute and obscure basally and laterally; apical margins of terga very narrowly impunctate, punctures of the more apical terga becoming somewhat more coarse and sparse apically; pubescence very short, sparse and obscure, hardly evident above, rather copious on head and thorax below, sternum 6 with rather elongate, erect, yellowish hairs medially; pygidial plate considerably longer than basal width, strongly narrowed apically, tip subtruncate or obscurely incised, margins carinate, surface quite closely and finely punctate; sternum 6 narrowly rounded apically; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION — Massachusetts and Connecticut, August to October. This is recorded from Illinois.

Nomada (Heminomada) electella Cockerell

Nomada electella Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 612. ♀.

FEMALE—Length 7.5 mm.; lateral ocelli slightly nearer margin of vertex than each other; cheeks considerably more than half width of eyes, posterior margin strongly carinate; basal segment of flagellum very short, not much longer than broad, and less than half length of segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd approximately equal anteriorly, veins testaceous, basal vein considerably basad of transverse median; tegulae shining between fine and rather close punctures, outer and posterior margins impunctate; posterior margin of scutellum quite deeply grooved medially; front coxae with triangular denticles posteriorly, but hardly spined; apex of hind tibiae with three or four testaceous bristles, the outermost elongate; clypeus, labrum and mandibles except tips, testaceous, a spot on supraclypeal area and the narrow malar space anteriorly, yellow, head otherwise black; antennal scape and basal segment of flagellum more testaceous, flagellum otherwise more reddish-testaceous; pronotal collar, tubercles, scutellum except anterior margin, and a rather vague, transverse stripe on mesopleura, yellow; tegulae yellowish-testaceous; thorax otherwise black; legs largely testaceous, more or less tinged with yellowish on tibiae, spurs pale yellow; basal abdominal tergum largely reddish, tinged with yellow on each side of median area, terga 2-5 with conspicuous yellow maculae, otherwise more reddish, maculations of 2 occupying most of disc laterally, rather widely separated medially, those on 3 somewhat narrowed and more widely separated; tergum 4 with a subapical transverse band which is narrowly interrupted medially and subinterrupted on each side, and 5 yellow along apical margin, more broadly so near mid-line; punctures of face above antennae, on vertex and on cheeks very coarse, deep and close, those below antennae much finer and more shallow, especially on clypeus; scutum and mesopleura very coarsely and deeply rugoso-punctate, punctures becoming somewhat crowded on pleura above, those on scutellum deep and distinct, crowded only in part; posterior

face of propodeum below coarsely rugoso-punctate, lateral faces becoming rather smooth but dull toward the metapleura, triangle very coarsely rugoso-striate along upper margin, becoming more finely so below; basal abdominal tergum almost impunctate, the exceedingly minute, well separated punctures hardly visible; discs of 2-4 with minute and rather close punctures, the rather broad, impressed apical margins entirely impunctate; tergum 5 more deeply, distinctly, closely and coarsely punctate, especially toward apical margin; pseudopygidium transverse, very short, forming the rather narrow, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short, thin and obscure, somewhat more evident on thorax below and on posterior face of propodeum laterally, entirely pale where evident; sternum 5 with a pair of sublateral tufts of long, somewhat curved, yellowish hairs on each side of mid-line.

DISTRIBUTION—Rhode Island to Georgia, June and July.

FLOWER RECORD—*Ceanothus.*

Nomada (Heminomada) festiva Cresson

Nomada festiva Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 289. ♀.

FEMALE—Length 9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat more than half width of eyes, posterior margin strongly carinate; shorter side of basal segment of flagellum very slightly shorter than segment 2, median segments slightly longer than broad; mandibles rather robust, simple; wings subhyaline basally, becoming lightly infuscated apically and in marginal cells, with the usual three submarginal cells, 2nd and 3rd rather narrow but about equal anteriorly, veins testaceous to brownish, basal vein slightly basad of transverse median; tegulae shining between deep, distinct, rather fine and close punctures; posterior margin of scutellum deeply depressed medially; front coxae not spinose; apex of hind tibiae with no evident setae or bristles, only finely short pubescent; clypeus supraclypeal area below, lateral face marks, labrum, and base of mandibles, bright yellow, face marks ending abruptly at level of antennae, and lateral clypeal sutures infused with black; face, vertex and cheeks otherwise black; antennal scape bright yellow anteriorly, pedicel and basal segment of flagellum more testaceous, the following segments more piceous; pronotal collar, tubercles, tegulae, scutellum in large part, a pair of large maculae on posterior face of propodeum, and a small transverse submedian mark on mesopleura, bright yellow, thorax otherwise black; front and mid coxae dark, the hind coxae with some yellow beneath, blackish above, femora testaceous in general, with some piceous basally, the tibiae and front and mid tarsi bright yellow, hind tarsi more testaceous basally, becoming yellow apically, spurs pale yellow; abdominal terga 1-5 with conspicuous, bright yellow maculations, that on tergum 1 a transverse, submedian and rather narrow band, tergum 2 with extensive yellow areas laterally, this somewhat narrowed medially, and narrowly interrupted at mid-line, the disc blackish apically; tergum 3 with a pair of rather widely separated, yellow maculations, and tergum 4 with more extensive lateral maculations which do not quite meet at mid-line, tergum 5 largely yellow, but with a narrow, median, dark area; abdominal sterna 1-4 more or less yellow basally, apical impressed rims largely reddish-hyaline; face above antennae, vertex and cheeks very coarsely, closely and deeply but distinctly punctate, punctures below antennae quite deep on each side, but supraclypeal area and clypeus very finely and closely punctate; scutum, scutellum and mesopleura very coarsely, closely and deeply punctate, becoming rugose on scutum laterally and on pleura above, contiguous on maculated area of scutellum, propodeum somewhat more finely but closely punctate posteriorly, punctures becoming very fine and irregular laterally, surface more or less shining and minutely punctate toward mid coxae, triangle impunctate but dull and tessellate; discs of abdominal terga 2-5 very finely, closely, deeply and distinctly punctate, much more minute across apical half of basal tergum, becoming more minute and obscure laterally and basally, punctures of the more apical terga becoming somewhat more coarse, deep and distinct toward apical margins, only the very narrow apical rims impunctate; pseudopygidium transverse, very narrow, forming the rather narrow apical margin of tergum 5, densely covered with suberect, pale yellowish tomentum; pubescence extremely short, thin, sparse and obscure, hardly evident, entirely pale where visible; sternum 5 apically with a dense tuft of elongate, more or less curved, yellowish hairs that converge toward mid-line.

DISTRIBUTION — Massachusetts and New Jersey. No seasonal records have been found.

Nomada (Heminomada) fragariae new species
(Fig. 105)

MALE — Length 9-10 mm., lateral ocelli very slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin strongly carinate; antennal scape strongly swollen, apex deeply excavated, completely enclosing pedicel, longer side of basal segment of flagellum slighty shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining, punctures fine and close along inner margin, becoming sparse along outer margin; posterior margin of scutellum quite deeply impressed medially; front coxae not spinose; hind femora slender and unmodified; face chiefly yellow below level of antennae, but lateral clypeal sutures black; face above antennae, vertex and cheeks in large part black, cheeks below narrowly yellow along margin of eye, and a very small yellow spot at top of eye; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; pronotal collar, tubercles, tegulae, scutellum except anterior margin, a pair of small spots on each side of propodeal triangle, a pair of larger maculations on posterior face below, and a transverse maculation along mesopleura, bright yellow, scutum narrowly margined with yellow on each extreme side; thorax otherwise black; front and mid coxae largely yellow, hind coxae dark basally, more or less yellow apically, legs otherwise largely testaceous, the femora narrowly yellow at apex, and hind tibiae tipped with yellow, spurs pale yellow; abdominal terga 1-6 with transverse, bright yellow bands, that on tergum 1 submedian, rather narrow, more or less interrupted medially; bands on terga 2 and 3 submedian, very broad laterally, slightly constricted medially, those on 4-6 more nearly apical in position, the more basal terga piceous basally and apically, becoming more ferruginous on the more apical terga; discs of abdominal sterna largely yellow, the broad, impressed, subhyaline margins more ferruginous, basal sternum yellow only along mid-line; vertex and upper half of face coarsely rugoso-punctate, cheeks becoming more finely so below, lower part of face closely but more distinctly punctate laterally, supraclypeal area and clypeus very finely and rather obscurely punctate; scutum densely rugose, scutellum slightly more coarsely and distinctly but very closely punctate, mesopleura very coarsely rugose or reticulate; propodeum rather coarsely rugose posteriorly and laterally, but lateral faces becoming relatively smooth and shining below, triangle rather smooth but densely tessellate below, becoming rather coarsely and irregularly rugoso-striate medially and along upper margin; discs of abdominal terga very finely, closely and deeply punctate, punctures becoming somewhat finer apically, apical rims narrowly impunctate; tergum 1 becoming impunctate laterally and basally, the more apical punctures on terga 4-6 becoming somewhat more coarse and distinct; pubescence very short and thin, pale yellowish above, more whitish below, rather copious over head and thorax, very thin and obscure on abdomen dorsally, hairs on sternal plates somewhat more elongate but very sparse, becoming rather dense, erect and quite short on sternum 6 apically; median length of pygidial plate slightly greater than basal width, only slightly narrowed apically, apex quite broadly emarginate, margins strongly carinate, surface quite closely and rather coarsely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

TYPES—Holotype: Male, Faison, N. C., April 20, 1955 (Mitchell, on *Fragaria*) [author's coll.]. Paratypes: 1 ♂, Ft. Lee, Va., May 16, 1959 (R. R. Snelling); 1 ♂, Alachua Co., Fla., Feb. 23, 1957 (H. V. Weems, Jr., on *Prunus angustifolia*).

Paratypes are in collections of R. R. Snelling and the Florida Plant Board.

Nomada (Heminomada) graenicheri Cockerell

Nomada (Xanthidium) Graenicheri Cockerell, 1905. Canad. Ent. 37, p. 189. ♀.

Nomada graenicheri Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1, p. 238. ♀ ♂.

No specimens of *graenicheri* have been found in any of the collections received for study. The following descriptive note was made from the type at the U. S. National Museum:

FEMALE—Length 10 mm.; mandibles simple; coxae not spined; punctures in general fine and close, densely crowded on face above antennae, more distinct but close below and on clypeus, some shining spaces on cheeks below; scutum densely and rather finely rugoso-punctate, crowded on pleura above, becoming slightly separated and coarser below; scutellum deeply grooved; propodeum dull, a few punc-

tures on each side of triangle; abdominal terga densely and minutely punctate, only the very narrow apical rims being impunctate on terga 2-4, tergum 1 with a subapical black band which is more distinctly and sparsely punctate; color black except for yellow areas as follows; a pair of apical spots on each side of clypeus, lateral areas between clypeus and eyes, extending more narrowly along orbits to top of eyes, a very narrow line along upper half of posterior orbits, collar, tubercles, tegulae, transverse band on pleura below, a pair of large spots on scutellum and a band on metanotum, compete but narrow transverse bands on abdominal terga 1-5, and on sterna 2 and 3, a median blotch on 4; all coxae yellow in part, the femora dark below, yellowish to ferruginous above, front and mid tibiae and tarsi largely ferruginous, hind tibiae largely yellow, darkened on inner and outer surfaces apically, the basitarsus piceous, apical joints more reddish.

DISTRIBUTION—Wisconsin.

Nomada (Heminomada) imbricata Smith

Nomada imbricata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 246. ♀.

Nomada (Holonomada) imbricata(?) Packard, 1897. N. Y. Ent. Soc. Jour. 5, p. 83-87. larva and pupa.

Nomada (Holonomada) imbricata Viereck, 1916. Conn. State Geol. and Nat. Hist. Survey Bul. 22 (3), p. 727. ♀.

FEMALE—Length 9-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin carinate; shorter side of basal segment of flagellum only slightly shorter than segment 2, median segments only slightly longer than broad; mandibles rather slender and simple apically; wings hyaline basally, becoming faintly yellowish apically, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae somewhat shining between quite deep and distinct, rather fine punctures, these close anteriorly, becoming rather sparse posteriorly; posterior margin of scutellum rather deeply depressed medially; front coxae not spinose; posterior apical angle of hind tibiae with a pair of short, triangular, acute tubercles; face chiefly yellowish-ferruginous, more yellowish below antennae, somewhat more reddish above; antennal scape testaceous, flagellum brownish-testaceous; thorax in large part ferruginous, pronotal collar, tubercles, and a pair of small maculations on scutellum, yellow, and propodeum with a pair of small and rather indefinite yellow areas on each side; tegulae testaceous; prothorax black laterally; propodeum largely ferruginous, with a small yellow spot on each side of posterior face, a broad black band on each lateral face, and a restricted blackened area just below metanotum medially; legs testaceous in large part, front and mid tibiae more or less tinged with yellow, spurs pale yellow; abdominal terga reddish, with yellow maculations, basal tergum largely reddish, with faint, obscure, yellow areas on each side, the apical, impressed area more piceous; tergum 2 with broad, lateral, yellow maculations, ferruginous medially and apically; terga 3-5 with transverse, subapical bands that are of rather uniform width, that on 5 subapical, broad medially, narrowly constricted at each side; discs of sterna 3 and 4 more or less yellow medially, apical margins broadly impunctate, reddish-hyaline; punctures coarse, close, deep and distinct on face above antennae and on vertex, somewhat finer on cheeks, rather coarse on each side of face below antennae, very fine and close on supraclypeal area and clypeus; scutum and mesopleura densely and quite coarsely rugosopunctate, scutellum with very coarse, deep and distinct punctures; propodeum shallowly rugose posteriorly, becoming somewhat smoother but dull on the lateral surfaces, triangle impunctate but densely tessellate, becoming irregularly striate above; basal abdominal tergum very minutely and obscurely punctate across median area apically, becoming practically impunctate laterally and basally; discs of terga 2-5 very finely and closely punctate basally, punctures becoming obscure laterally, the apical impressed areas largely impunctate, with the more apical punctures on discs of 4 and 5 somewhat more sparse and distinct; pseudopygidium transverse, very short, forming the rather narrow apical margin of tergum 5, densely covered with suberect, pale yellowish tomentum; pubescence very thin, short, obscure, somewhat more copious on head and thorax below, but visible above, rather dense on propodeum, abdomen largely bare but with somewhat more elongate hairs apically; apex of sternum 5 with a pair of tufts of elongate, curved, yellowish hairs that converge medially.

DISTRIBUTION—New York and the New England states, to Nova Scotia, May and June.

Nomada (Heminomada) luteola Olivier
(Fig. 105)

Nomada luteola Olivier, 1811. Encycl. Meth., 8, p. 365.
Xanthidium luteolum Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE — Length 9.5-13 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks very slightly narrower than eyes, posterior margin sharply carinate; shorter side of basal segment of flagellum more than half the length of segment 2, longer side not equalling segment 2 in length, median segments somewhat longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins testaceous to piceous, basal vein slightly basad of transverse median; tegulae shining between deep, distinct, rather coarse and close punctures; posterior margin of scutellum quite deeply grooved medially; front coxae not spined; apex of hind tibiae with a row of 7 or 8 robust, yellowish bristles; face and cheeks in large part yellow, with a limited amount of black above each antennae and around ocelli, these separated by a transverse yellow band, vertex and posterior margin of cheeks to some degree ferruginous; antennal scape yellowish anteriorly, becoming reddish to piceous posteriorly, basal segment of flagellum somewhat more reddish, the more apical segments piceous; pronotal collar, tubercles, tegulae, lateral margins of scutum, axillae, scutellum, adjacent median area of metanotum, posterior face of propodeum in large part, and upper half of mesopleura, bright yellow; scutum with a median black line slightly separated from a pair of narrow yellow lines by ferruginous, and a broad band of ferruginous between the median and lateral yellow lines; propodeum narrowly black medially, the lateral faces and metapleura largely black; mesopleura below ferruginous; coxae in part yellow, with some ferruginous infusions; trochanters testaceous, the femora testaceous basally, becoming more or less yellow apically; tibiae yellow at base and apex, more or less infused with testaceous medially; tarsi yellow-testaceous, the spurs pale yellow; basal abdominal tergum with a broad, transverse, yellow band, piceous basally, the impressed, apical margin ferruginous; discs of terga 2-5 yellow in large part, the apical impressed areas ferruginous; abdominal sterna yellow in large part, apical, impressed areas more testaceous-hyaline; punctures deep, distinct and quite close over most of head, very coarse and quite distinct laterally and above, much finer and closer on cheeks, supraclypeal area and clypeus; scutum, scutellum and mesopleura coarsely rugoso-punctate, punctures of scutellum crowded but distinct; posterior face of propodeum with scattered, irregular, rather shallow, coarse punctures, these becoming closer on lateral faces above, shining and rather smooth below, triangle impunctate but rather dull, becoming very short striate above; abdominal terga very finely, closely and uniformly punctate throughout, punctures almost crowded, only the very narrow apical rims impunctate; pseudopygidium transverse, very short, forming the rather broad, apical margin of tergum 5, densely covered with suberect silvery tomentum; pubescence very short, thin and inconspicuous throughout, somewhat yellowish, very obscure on abdomen dorsally, hairs somewhat more elongate beneath; apex of sternum 5 with a pair of tufts of elongate yellowish hairs that converge medially.

MALE—Length 9-13.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin strongly carinate; antennal scape swollen, apex quite deeply excavated, partially enclosing pedicel, basal segment of flagellum very short, the shorter side no more than half the length of segment 2, median segments somewhat longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd only slightly broader than 3rd anteriorly, veins testaceous to brownish, basal vein slightly basad of transverse median; tegulae shining between close, deep and distinct punctures; posterior margin of scutellum slightly grooved medially; front coxae not spinose; hind femora unmodified; face largely yellow below level of antennae, the supraclypeal area and upper half of clypeus narrowly bordered with black, cheeks quite broadly yellow just back of eye, a small yellow spot below anterior ocellus and a similar spot above each eye; face above antennae, vertex and cheeks posteriorly black, the lateral maculae ending rather narrowly on margin of eye slightly above antennae; antennal scape yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous below, piceous above; pronotal collar, tubercles, tegulae, axillae, scutellum, adjacent median area of metanotum in part, a pair of broad, quadrangular maculae on propodeum, a rounded maculation below each wing, and a broad, transverse, yellow band on mesopleura medially, bright yellow; thorax otherwise chiefly black, scutum and metapleura entirely so, and adjacent areas of

propodeum black; coxae yellow in large part; front legs largely yellow, the trochanters and femora except apex more ferruginous posteriorly, and tibiae with a reddish infusion; mid and hind trochanters and femora ferruginous in part, femora becoming yellowish apically, and tarsi yellow; spurs pale yellow; abdominal terga 1-6 with broad, entire, transverse, yellow bands that are more or less median in position, bordered basally and apically by piceous areas, these becoming somewhat more ferruginous on the more apical terga; sterna 1-6 yellow in large part, the broad, depressed apical margins more or less reddish-hyaline; punctures close and deep over most of head, quite coarse and distinct on face laterally and above, and on vertex and cheeks, very fine and obscure on supraclypeal area and clypeus, becoming very sparse on each side of clypeus above mandibles; scutum, scutellum and mesopleura coarsely rugoso-punctate, scutum very densely so; posterior face of propodeum more finely and shallowly but quite densely rugoso-punctate, lateral faces becoming rather coarsely rugose above, rather smooth, somewhat shining below; abdominal terga very minutely, closely and uniformly punctate throughout, only the very narrow apical rims impunctate; pubescence very short and thin but quite copious over head and thorax, entirely pale yellowish, very short and obscure, hardly evident on abdomen dorsally, abdominal sterna with somewhat more elongate, sparse hairs; apex of sternum 6 with considerable erect and rather elongate yellowish pubescence medially; median length of pygidial plate somewhat greater than basal width, rather strongly narrowed apically, tip deeply incised, margins carinate, surface rather shallowly, irregularly punctate; exposed abdominal sterna unmodified, sternum 6 strongly narrowed apically; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Illinois to Virginia, south to Florida, March to June.

FLOWER RECORDS — *Batodendron, Malus, Prunus, Pyracantha, Rubus, Taraxacum* and *Vaccinium.* This is recorded by Robertson (1929) on *Antennaria, Arabis, Cercis, Dentaria, Erythronium, Geranium, Ribes, Salix, Stellaria, Taenidia* and *Zanthoxylum.*

The form described above is that which has come to be accepted as Olivier's *luteola,* but it is not certain that it is correct. The description is too brief, and the type specimen has not been located. It seems best to continue using this name, however, until it has been shown to be erroneous.

Nomada (Heminomada) miniata Smith

Nomada miniata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 250. ♀

Nomada miniata Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 311.

No specimens of *miniata* have been collected, nor any found in any of the collections studied by this writer. The following descriptive note was made from the type specimen in the British Museum:

FEMALE—Length 10 mm.; mandibles very long and slender, simple, tip of one nearly reaching base of other when closed; basal segment of flagellum not much longer than broad, shorter than segment 2 even when measured along the longer side; head almost entirely ferruginous, obscurely yellow on lower inner orbits, closely punctate, rather finely so below antennae and on cheeks, somewhat more coarsely so above; front coxae not spined; legs entirely ferruginous, spurs yellow; scutum rugoso-punctate, largely red, with a pair of lateral yellowish lines (probably discolored); scutellum pale ferruginous, quite deeply incised medially, shallowly rugoso-punctate;

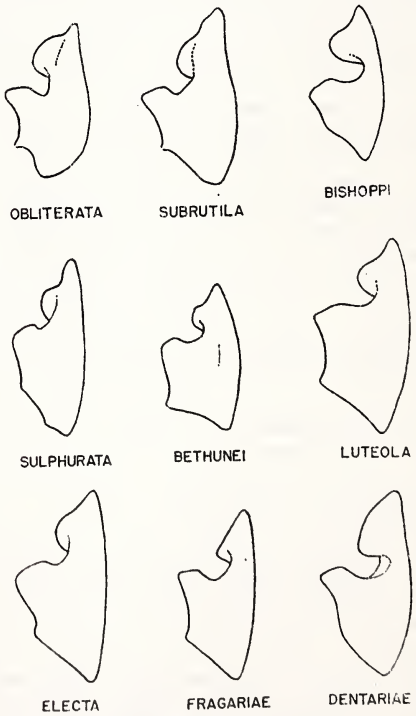


Figure 105
Right gonocoxite in males of *Nomada.*

pleura red, with a median, transverse, yellowish band, finely rugoso-punctate; metapleura red; propodeum red laterally and in triangle, posterior surface yellowish; tegulae very closely and rather coarsely punctate; wings subhyaline, narrowly infumate toward apex, basal vein nearly interstitial with transverse median; basal abdominal tergum smooth, punctures exceedingly minute and obscure, entirely red; 2nd and following terga very finely and closely punctate, punctures invading to some degree the depressed apical margins, these somewhat yellowish-hyaline, but discs red, tergum 2 with a pair of conspicuous, widely separated, yellow maculae; pseudopygidium of normal size.

DISTRIBUTION—Georgia.

Nomada (Heminomada) obliterata Cresson

(Figs. 105 & 106)

?Nomada pulchella Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 247.♂

Nomada obliterata Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 301. ♀

Nomada viburni Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 341. ♂.

Heminomada obliterata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7-8.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks only slightly narrower than eyes, posterior margin carinate; longer side of basal segment of flagellum equal to segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming somewhat yellowish apically, with only two submarginal cells due to the loss of the first transverse cubitus (fig. 106), the first recurrent vein thus entering the first submarginal cell, the 2nd entering the 2nd submarginal near the middle, veins testaceous, basal vein slightly basad of transverse median; tegulae shining between quite deep and distinct punctures, these quite sparse posteriorly and along outer margin; posterior margin of scutellum slightly impressed medially; front coxae not spined; apex of hind tibiae with 3 or 4 short but distinct, testaceous bristles; face largely yellow below level of antennae, with a small amount of black between ocelli, upper part of face, vertex and cheeks largely ferruginous, a small area of yellow posterior to eyes below, the lateral face marks ending narrowly near top of eye; antennal scape reddish-yellow anteriorly, flagellum more brownish-testaceous; thorax largely red, but pronotal collar, tubercles, two large spots on scutellum and some more or less vague spots on propodeum posteriorly, yellow; tegulae more testaceous; metapleura and narrow adjacent margin of propodeum black; posterior surface narrowly black medially; abdomen red, terga 2-5 with broad, transverse, yellow bands, those on 2 and 3 strongly constricted medially, sometimes more or less broadly interrupted, those on 4 and 5 of rather uniform width, submedian on all except on 5 where it is more nearly apical; legs in large part reddish-testaceous, spurs pale yellow; face above antennae, vertex and cheeks rather coarsely rugoso-punctate, punctures close but distinct on lower part of face, very fine and close on supraclypeal area, shallow but distinct and rather coarse on clypeus; scutum with coarse, deep and contiguous punctures, those on the shining scutellum quite sparse, mesopleura quite coarsely rugoso-punctate, propodeum more finely rugose, especially at sides, triangle somewhat rugose medially, becoming irregularly and finely striate at each side above; discs of abdominal terga very finely, closely and rather distinctly punctate, rather sparsely so toward apical margins; tergum 1 impunctate laterally and basally; pseudopygidium transverse, rather extensive, median length nearly half the breadth, forming the truncate apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence extremely short in general, thin, more elongate and copious on head below, entirely whitish where evident, very obscure on abdomen dorsally, sternum 5 apically with a pair of tufts of elongate hairs on each side which converge medially.

MALE—Length 7-9 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum somewhat shorter than segment 2, median segments slightly broader than long; mandibles slender and simple apically; wings hyaline basally, becoming somewhat yellowish apically, with but two submarginal cells due to the loss of the first transverse cubitus, 1st recurrent vein thus entering 1st submarginal, 2nd entering at middle of 2nd submarginal, veins testaceous to piceous, basal vein somewhat basad of transverse median; tegulae shining between rather deep, distinct, fine and rather close punctures; posterior margin of scutellum rather deeply grooved; front coxae not spined; hind femora slender and simple; face entirely yellow below level of antennae, lateral face marks extending very narrowly to top of eye, and cheeks below

yellow along posterior eye margin nearly to the top; face above antennae, vertex and cheeks posteriorly, black; antennal scape yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; pronotal collar, tubercles, tegulae, scutellum in large part, a pair of rather conspicuous, lateral maculations on propodeum posteriorly, and a large anterior maculation on mesopleura, bright yellow, thorax otherwise black; front legs, including coxae, largely yellow, the femora and trochanters more ferruginous posteriorly; mid and hind legs more ferruginous, femora yellow apically, mid tibiae more or less yellow anteriorly, mid basitarsi yellow, spurs pale yellow; abdominal terga 2-6 with broad, transverse, yellow bands, these somewhat constricted medially on 2 and 3, of more uniform width on 4-6, basal tergum piceous basally, more or less testaceous medially, and darker red apically; sterna 2-6 more or less yellow, apical margins testaceous-hyaline; face above antennae, vertex and cheeks quite coarsely rugoso-punctate, punctures rather shallow but close and coarse on face below antennae, crowded on supraclypeal area, and quite distinct on clypeus, becoming very sparse on each side; scutum and mesopleura densely and rather coarsely rugoso-punctate, punctures of scutellum more distinct, coarse, deep and rather close, more shallowly rugose on propodeum, both posteriorly and laterally, the triangle rather coarsely and sparsely striate; discs of abdominal terga with close, fine, quite deep and distinct punctures, these becoming somewhat more coarse and sparse apically on the more apical terga, but quite close across disc of tergum 6; pubescence rather short, entirely pale, quite copious over most of head and thorax, very short and inconspicuous on abdomen dorsally, very thin and sparse on sterna 1-5, sternum 6 with quite dense, erect, pale hairs apically; median length of pygidial plate about equal to basal width, quite strongly narrowed to the subtruncate tip which is sometimes incised medially, margins carinate, surface very closely punctate; exposed sternal plates unmodified, sternum 6 subtriangular, apex rather narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION — Minnesota to New York, south to South Carolina, April to June.

FLOWER RECORDS — *Stellaria* and *Taraxacum*. Robertson (1929) records this species on *Antennaria, Chaerophyllum, Claytonia, Heracleum, Prunus, Salix* and *Viburnum*.

Efforts to locate the type of *Nomada pulchella* Smith in the British Museum and in the Hope Museum at Oxford were fruitless, and its identity remains in doubt. The brief description indicates a similarity with a small specimen of *obliterata*, but there are some slight differences and much is omitted, including any reference to the number of submarginal cells.

Nomada (?Heminomada) ochlerata new species

MALE—Length 7 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin carinate; antennal scape only slightly swollen, but apex deeply excavated and completely enclosing pedicel, basal segment of flagellum very short, not much longer than the apical breadth, and very much shorter than segment 2, median segments somewhat longer than broad; mandibles quite slender and simple apically; wings hyaline basally, becoming rather faintly infuscated at apex and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein slightly basad of tranverse median; tegulae shining, punctures fine, close anteriorly, becoming rather sparse posteriorly; posterior margin of scutellum slightly impressed medially; front coxae not spined; hind femora slender and unmodified; clypeus, labrum, mandibles and lateral facial maculae, yellow, the maculae ending rather abruptly at level of antennae; supraclypeal and adjacent areas of face, cheeks in large part and entire face above antennae black, cheeks below with a yellow mark along eye margin; antennal scape yellow anteriorly, piceous posteriorly, flagellum more brownish-testaceous; thorax largely black, only the tubercles, tegulae and a pair of spots on scutellum, yellow; coxae black, front legs largely testaceous, the femora more brownish along lower margin; middle legs testaceous, the femora brownish posteriorly, and tibiae infused with brownish; hind femora more piceous, becoming yellow apically, tibiae yellowish at base and apex but more brownish-testaceous medially; all spurs pale yellow; abdominal terga 1-6 more or less completely yellow banded, that on 1 rather narrow, subinterrupted medially, becoming quite broad laterally, that on 5 quite narrow, entire, subapical, and 6 quite broadly yellow across disc; tergum 1 piceous basally, more reddish apically, nonmaculated areas of 3 somewhat more piceous, and base of 4 and 5 piceous, apical margins of 4-6 yellowish-

hyaline; abdominal sterna largely dark, sternum 2 with some obscure, lateral, yellow areas, apical margins broadly yellowish-hyaline; vertex and upper part of face coarsely rugoso-punctate, cheeks somewhat more finely so, area between antennae and clypeus quite coarsely rugoso-punctate, punctures of clypeus very minute, close and obscure; scutum densely rugose, scutellum with somewhat more distinct but close and contiguous punctures, mesopleura very coarsely rugoso-punctate; posterior face of propodeum more shallowly but coarsely rugoso-punctate, becoming rather smooth on lateral faces below, triangle impunctate but dull and densely tessellate below, becoming rather narrowly striate above; discs of abdominal terga very finely, closely and rather distinctly punctate, punctures becoming more minute and obscure on apical impressed areas; tergum 1 becoming impunctate laterally and basally, the more median apical punctures minute but rather close; pubescence entirely pale, quite thin, rather copious on head and thorax, very thin and short on abdomen dorsally, becoming somewhat more elongate on the more apical terga, very thin and elongate on sterna, becoming rather dense but short and erect on sternum 6 apically; median length of pygidial plate about equal to basal width, rather strongly narrowed apically, tip with a rather deep, rounded, median emargination, carinate laterally, surface very closely but rather shallowly punctate; exposed sternal plates unmodified, sternum 6 rather strongly narrowed to the tip, thus subtriangular, with the apex narrowly rounded; gonocoxites of genital armature similar to those in *fragariae* (fig. 105).

TYPE — Holotype: Male, Ann Arbor, Washtenaw Co., Mich., May 9, 1935 (I. J. Cantrall) [Hubbell].

Nomada (Heminomada) pseudops Cockerell

Nomada (Xanthidium) pseudops Cockerell, 1905. Canad. Ent. 37, p. 189. ♀.

FEMALE—Length 9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin conspicuously carinate; basal segment of flagellum very short, no longer in front than broad, the longer side considerably shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple; wings hyaline basally, becoming somewhat deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae deeply, distinctly and rather coarsely and closely punctate throughout; posterior margin of scutellum deeply impressed medially; front coxae not spinose; apex of hind tibiae with a row of very short, quite robust, brownish bristles separated from a quite distinct posterior angle by a rounded or emarginate space; head largely red, the lower inner orbits, malar space and labrum more or less yellow, space between ocelli, and the narrow, posterior margin of cheeks black; antennal scape testaceous, flagellum more brownish-testaceous; pronotal collar, tubercles, two small anterior maculations on mesopleura below tubercle, and a small, posterior maculation just above mid coxae, yellow; posterior face of propodeum broadly yellow on each side of midline; thorax otherwise largely red, tegulae more testaceous, scutum with a narrow, median, black line, the metapleura and adjacent area of propodeum black; legs largely testaceous, but front and mid coxae in part, front tibiae anteriorly, and front tarsi, yellow, mid tarsi yellowish-testaceous, spurs pale yellow, mid and hind femora more or less infused with piceous basally; abdominal terga 2-5 with broad, transverse, yellow bands, those on 2 and 3 often interrupted medially, discs otherwise largely reddish, basal tergum with a median, reddish band, more piceous basally and apically, band on tergum 4 submedian, that on 5 more apical; abdominal sterna 3-5 to some degree yellow, the broadly impunctate rims testaceous-hyaline; head in large part closely and deeply rugoso-punctate, coarsely so on face above antennae and on vertex, more finely so on cheeks below and on supraclypeal area and clypeus, lateral areas of face closely and deeply punctate; scutum medially and scutellum coarsely, deeply and closely punctate, scutum becoming more finely rugose laterally, mesopleura very coarsely rugoso-punctate, propodeum more finely and shallowly rugose posteriorly, lateral faces becoming somewhat smoother but dull below; discs of abdominal terga very finely, closely and quite deeply punctate, punctures becoming slightly more sparse toward the narrowly impunctate, apical rims, tergum 1 becoming impunctate laterally toward base; pseudopygidium transverse, very narrow, forming the truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence extremely short and thin, somewhat more copious and elongate on head below and on propodeum posteriorly, entirely whitish where visible, hardly evident on abdomen dorsally, very thin and sparse ventrally; sternum 5 with a pair of apical tufts of elongate, curved, brownish hairs on each side of midline, which tend to converge medially.

DISTRIBUTION—Wisconsin to Massachusetts, May and June.

FLOWER RECORD—*Rubus*.

Nomada (Heminomada) subrutila Lovell and Cockerell

(Fig. 105)

Nomada (Xanthidium) subrutila Lovell and Cockerell, 1905. Psyche 21, p. 40. ♂.

MALE—Length 7-8.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly as broad as eyes, posterior margin carinate; antennal scape somewhat swollen, apex deeply excavated, completely enclosing the pedicel, longer, upper side of basal segment of flagellum about equal to segment 2, median segments somewhat longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming faintly yellowish apically, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins yellowish to testaceous, basal vein interstitial with transverse median; tegulae shining between rather deep and distinct punctures, these becoming quite sparse along outer margin and posteriorly; posterior margin of scutellum shallowly impressed medially; front coxae not spined; hind femora slender and unmodified; clypeus, labrum, mandibles, lower half of supraclypeal area, and narrow lateral facial maculae, bright yellow, the lateral maculae extended narrowly to top of eye and separated from antennae and upper part of clypeal margin by a broad black area; face above, vertex, and most of cheeks, black, the hind margin of eyes narrowly bordered with yellow nearly to top; antennal scape bright yellow anteriorly, more piceous posteriorly, flagellum brownish-testaceous; two spots on pronotal collar (sometimes lacking), tubercles, tegulae, two small spots on scutellum, and small anterior maculations on mesopleura, bright yellow; thorax otherwise entirely black; front coxae yellow in large part, the mid and hind pair with small yellow maculations, otherwise black; front legs largely yellow, becoming piceous on posterior face of femora and a small red spot on tibiae posteriorly; mid and hind trochanters and femora more piceous, becoming somewhat reddish on anterior face basally, apex yellow, tibiae with median ferruginous to piceous infusions, mid tarsi yellow, hind tarsi yellow apically but basitarsi more testaceous, spurs pale yellow; abdominal terga 2-6 with broad, entire, bright yellow bands, these more or less submedian in position on the more basal terga, tergum 1 with a rather broad, submedian band which is rather widely interrupted medially, basal part of disc piceous, the more apical part ferruginous; bands on terga 2 and 3 slightly narrowed medially, those on 5 and 6 more apical, apical margins of 5 and 6 rather broadly yellowish-hyaline; sterna 2-6 largely yellow basally, depressed apical rims becoming yellowish-hyaline; blackened areas of face coarsely rugoso-punctate, cheeks somewhat more finely so below, maculated areas of face more finely and closely punctate, becoming very sparsely so on each side of clypeus below, supraclypeal area and clypeus very finely and quite closely punctate; thorax densely rugoso-punctate, somewhat more coarsely so on mesopleura below, lateral faces of propodeum somewhat smoother but dull below, triangle dull and densely tessellate below, becoming quite coarsely, irregularly striate along upper margin; discs of abdominal terga very deeply, distinctly, finely and closely punctate in general, punctures becoming somewhat more sparse apically on the more apical segments, lateral and basal areas of tergum 1 becoming minutely and obscurely punctate; pubescence pale yellowish, thin but erect and rather copious on head and thorax, very short and inconspicuous on abdomen dorsally, more elongate and sparse on the sterna, sternum 6 with erect, pale yellowish pubescence apically; median length of pygidial plate slightly less than basal width, quite strongly narrowed to the narrowly incised, rounded tip, margins carinate, surface quite closely and coarsely punctate; exposed abdominal sterna not modified, sternum 6 rather broadly rounded apically; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Michigan to the New England states, in May.

Nomada (Heminomada) sulphurata Smith

(Fig. 105)

Nomada sulphurata Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 249. ♀.

Nomada luteoloides Robertson, 1895. Amer. Ent. Soc. Trans. 22, p. 124. ♀. New synonymy

?Nomada (Heminomada) luteoloides var. Rodeck, 1931. Amer. Mus. Novitates 496, p. 11. ♀.

Xanthidium luteoloides Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-11.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks much narrower than eyes, posterior margin carinate; basal seg-

ment of flagellum much shorter than segment 2, the shorter side no more than half the length of 2; mandibles slender and simple apically; wings subhyaline basally, becoming somewhat infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae very closely, deeply and rather coarsely punctate throughout; posterior margin of scutellum rather deeply impressed medially; front coxae not spined; apex of hind tibiae with a dense brush of short dark bristles separated from a posterior angle by an emarginate area; face largely yellow below level of antennae, clypeal sutures black in part, eyes completely encircled by yellow, and a rounded yellow spot below anterior ocellus; median areas of face above vertex and posterior half of cheeks, black; antennal scape yellow anteriorly, becoming piceous posteriorly, basal segment of flagellum more brownish-testaceous, following segments more reddish-piceous; pronotal collar, tubercles, tegulae, lateral margins and a pair of submedian longitudinal lines on scutum, scutellum, adjacent median area of metanotum except center, posterior face of propodeum except mid-line, median transverse area of mesopleura and a rounded spot above, bright yellow, intervening areas largely black, but pleura below more or less ferruginous; front legs, including coxae, largely yellow, trochanters and femora more or less ferruginous posteriorly; mid and hind coxae yellow, the trochanters ferruginous, mid femora ferruginous at base becoming yellow apically, the tibiae and tarsi largely yellow; hind femora yellow in part, the posterior and ventral surfaces more piceous, tibiae and basitarsi largely yellow, the more apical tarsal segments testaceous; spurs pale yellow; abdominal terga 2-5 with broad, extensive, yellow bands occupying most of discs, tergum 1 with a narrow yellow band, blackish basally and apically, 2 very narrowly piceous or blackish across base, apical impressed areas of 2 and 3 dark reddish-piceous, more testaceous on 4 and 5; discs of abdominal sterna yellow in large part, the smooth, apical, impressed areas more testaceous-hyaline; punctures of head in large part coarse, deep and close but quite distinct, becoming somewhat finer and closer on supraclypeal area, very fine and vague on clypeus; scutum, scutellum and mesopleura coarsely rugoso-punctate, propodeum somewhat more finely so; discs of abdominal terga very finely and closely punctate throughout, but tergum 1 becoming impunctate laterally and basally, and the more apical punctures on tergum 5 becoming rather sparse and coarse; pseudopygidium transverse, very narrow, forming the rather broadly truncate apical margin of tergum 5, densely covered with suberect silvery tomentum; pubescence very short and thin, somewhat more copious on head, especially below, whitish below, more yellowish above, hardly evident on abdomen dorsally, abdominal sterna with more sparse and elongate pale hairs; apex of sternum 5 with lateral tufts of elongate, yellowish hairs which converge medially.

MALE—Length 9.5-11 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin obscurely carinate; antennal flagellum swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagelum no more than half length of segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming very lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd considerably broader anteriorly than 3rd, veins testaceous, basal vein much basad of transverse median; tegulae very closely, quite deeply and uniformly punctate throughout; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; hind femora slender and unmodified; lower half of face largely yellow, but with a narrow, blackened area below each antenna reaching margin of clypeus, the supraclypeal area yellow, lateral maculae ending rather abruptly slightly above level of antennae; face above, vertex, and cheeks in large part, black, the lower end of cheeks yellow; antennal scape yellow anteriorly, blackish posteriorly, flagellum piceous; pronotal collar, tubercles, tegulae, two separated maculations on scutellum, a pair of rather small, lateral maculations on propodeum below, and a large anterior maculation on mesopleura, bright yellow, thorax otherwise black; front and middle legs, including coxae, in large part yellow, femora more or less testaceous posteriorly, and tibiae with a testaceous infusion posteriorly; hind coxae yellow, the trochanters and femora more or less testaceous or yellowish anteriorly, piceous posteriorly, hind tibiae yellow in large part anteriorly, with a somewhat testaceous, median area, posterior surface in part piceous, basitarsi dark testaceous, the more apical segment somewhat lighter, spurs pale yellow; abdominal terga 1-6 with transverse yellow bands, these becoming quite narrow medially on 2-4, but quite broad at each side, that on basal tergum of more uniform width but somewhat constricted medially, submedian on all except 5 and 6 where they are more subapical; discs of abdominal sterna yellow in large part, the apical smooth impressed areas more testa-

ceous or piceous, basal sternum with a median yellow blotch; head in large part coarsely rugoso-punctate, becoming rather finely so on cheeks below, supraclypeal area and clypeus very finely and quite closely and shallowly punctate, lateral areas below very sparsely punctate and shining; scutum and scutellum rather finely and densely rugose, mesopleura somewhat more coarsely so, propodeum rather finely rugose both laterally and posteriorly, triangle densely tessellate and dull, becoming irregularly and rather finely rugoso-striate along upper margin; discs of abdominal terga very finely, closely and quite regularly punctate, but basal tergum becoming impunctate laterally and basally, punctures of the more apical terga becoming somewhat coarser and more distinct; pubescence short but rather copious over head and thorax, pale yellow in large part, becoming more whitish on thorax below, very short and hardly evident on abdomen dorsally, sterna with more sparse but elongate yellowish hairs, sternum 6 becoming quite densely pubescent apically, the hairs erect, pale yellowish; median length of pygidial plate about equal to basal width, rather strongly narrowed apically, apex deeply incised, margins carinate, surface rather coarsely and closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 105).

DISTRIBUTION—Minnesota to Massachusetts, south to Mississippi and Georgia, March to May.

FLOWER RECORDS—*Claytonia.* Robertson (1929) records this species (as *luteoloides,*) on *Cercis, Erythronium, Nothoscordum, Prunus, Ribes, Salix, Stellaria* and *Zanthoxylum.*

Nomada (Heminomada) xanthura Cockerell

Nomada xanthura Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 84. ♀.

FEMALE—Length 10 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin sharply carinate; longer side of basal segment of flagellum about equal to segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings somewhat yellowish basally, becoming rather deeply infuscated at apex and in marginal cell, with a hyaline area just beyond the submarginals, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins testaceous, stigma somewhat more ferruginous, basal vein slightly basad of transverse median; tegulae shining, very sparsely punctate, punctures evident only narrowly along inner margin; posterior margin of scutellum only faintly impressed medially; front coxae not spinose; apex of hind tibiae with a row of 4 or 5 rather slender, yellowish, seta-like bristles; head and thorax largely ferruginous, face with a median blackened area just above antennae and another between the ocelli; posterior margins of cheeks, upper half of clypeal sutures, and margin of supraclypeal area narrowly black; antennae testaceous beneath, more ferruginous above; tubercles and tegulae testaceous; pronotum laterally, mesopleura anteriorly and in part beneath, metapleura, mid coxae, adjacent rather narrow margin of propodeum, a very narrow, median line on scutum, and a broader, median line on propodeal triangle, black, thorax otherwise ferruginous; legs largely testaceous, femora more or less piceous at base, all spurs pale yellow; abdominal tergum 1 rather narrowly piceous basally, apical margin somewhat more reddish, the broad median area more or less testaceous; disc of tergum 2 largely yellow, 3 and 4 more narrowly yellow medially, and 5 largely yellow, impressed apical margins of all more ferruginous; abdominal sterna largely reddish-testaceous, with piceous infusions, impressed apical margins more or less yellowish-hyaline; face and vertex rather coarsely and deeply rugoso-punctate, cheeks much more finely so, becoming rather smooth below, supraclypeal area and clypeus with very fine and close but rather shallow and vague punctures; scutum and scutellum quite densely but not very coarsely rugoso-punctate, mesopleura much more coarsely rugose or reticulate, punctures becoming more distinct below; propodeum very finely but rather densely rugose, becoming somewhat more finely so on lateral margins anteriorly, triangle relatively smooth but dull below, becoming rather coarsely short-striate along upper margin; discs of abdominal terga very minutely and closely punctate, tergum 1 becoming impunctate laterally and basally, impressed apical margins of the more apical terga invaded to a considerable degree by minute and rather close punctures, tergum 5 more sparsely, coarsely and distinctly punctate apically; pseudopygidium very short, broadly transverse, forming the rather broad, truncate, apical margin of tergum 5, densely clothed with very fine, silvery tomentum; pubescence pale in large part but with conspicuous, erect, darker hairs on face, antennal scape, cheeks below and scutellum, pubescence very obscure on abdomen dorsally, but with numerous, erect, dark hairs visible in outline on the more apical terga, sterna with sparse erect darker hairs apically, apex of 5 with a transverse band of elongate, convergent, dark hairs on each side of mid-line.

DISTRIBUTION — New York to Nova Scotia, in June.

Table 12—Distribution of species of *Nomada (Callinomada, Phor, Pachynomada* and *Heminomada)* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Nomada	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
(Callinomada)																											
aquilarum							X																				
placida								X	X				X			X			X			X				
rodecki																						X					
(Phor)																											
integerrima			X	X		X			X				X		X				X	X		X					
proxima	X																										
(Pachynomada)																											
vincta									X													X					
(Heminomada)																											
annulata																						X					
autumnalis								X																			
bethunei								X			X																
bishoppi	X			X	X			X			X		X		X	X			X			X		X		X
capitalis		X						X													X	X					
colorata								X					X														
dentariae								X	X				X									X					
electa				X		X			X																		
electella					X														X								
festiva				X										X													
fragariae																			X			X					X
graenicheri							X																				
imbricata	X	X		X									X														
luteola									X	X									X	X	X	X				X	X
miniata																										X	
obliterata								X		X	X		X						X			X	X				
ochlerata								X																			
pseudops				X			X	X			X																
subrutila	X				X			X					X														
sulphurata				X				X			X	X	X						X	X		X		X		X	
xanthura	X												X														

Nomada (Nomada) armatella Cockerell
(Fig. 107)

Nomada armatella Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 606. ♂.

MALE—Length 8-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks somewhat narrower than eyes, posterior margin only subcarinate at most; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, the shorter side only about half the length of segment 2, median segments somewhat longer than broad; mandibles rather slender and simple apically; wings hyaline basally, becoming rather deeply but narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd considerably broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining, punctures minute and obscure, sparse laterally, becoming rather close along inner margin; posterior margin of scutellum only very slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, and narrow lateral facial maculae ending narrowly on eye margin slightly above level of antennae, yellow, the supraclypeal area more or less yellow medially, and cheeks with a yellow line below along margin of eye; face, vertex and cheeks otherwise black, extending to margin of clypeus and along clypeal sutures; antennal scape yellow anteriorly, more ferruginous posteriorly, flagellum brownish-testaceous beneath, somewhat more piceous above toward base, more ferruginous apically; pronotal collar, tubercles, tegulae and two large spots on scutellum, yellow, and mesopleura with a rather large anterior yellow maculation which is more or less bordered with ferruginous; scutum deep ferruginous, more or less blackish along median area, pleura and propodeum largely black, the mesopleura with a small reddish spot just below wing base; scutellum usually ferruginous along mid-line and posteriorly, adjacent area of metanotum ferruginous; front and mid tarsi and apices of all femora and tibiae, yellow, legs otherwise largely testaceous, hind femora more or less piceous, spurs pale yellow; abdominal tergum 1 broadly piceous at base and rather broadly ferruginous across apical margin, with a pair of transverse, yellow maculations at each side that are separated medially; discs of terga 2-4 largely yellow, interrupted medially with narrow red lines, apical impressed areas more reddish-testaceous, terga 5 and 6 with transverse, subapical, yellow bands, that on 5 narrowly extended nearly to lateral margins; abdominal sterna largely reddish-testaceous, sternum 6 narrowly yellowish at apex; face coarsely and closely punctate, punctures becoming much finer and more distinctly separated on maculated areas below, and very fine and obscure on clypeus, rather coarse on vertex medially, becoming considerably finer laterally, and cheeks becoming rather coarsely rugose below; scutum coarsely rugoso-punctate, mesopleura somewhat more shallowly rugose, scutellum coarsely rugose basally and medially, becoming rather finely and vaguely rugose laterally and posteriorly, and propodeum rather finely rugose, triangle rather smooth below but becoming broadly, coarsely, rugose-striate across upper half; discs of abdominal terga finely but quite deeply and distinctly punctate, quite closely so basally except on tergum 1 which is impunctate laterally and basally, apical margins invaded by the punctures, only the narrow apical rims impunctate; pubescence entirely pale, quite copious and elongate over head and thorax, obscuring surface on thorax below, very fine and obscure on abdomen dorsally, the sterna with more elongate but very fine, pale hairs, sternum 6 becoming rather densely pale yellowish pubescent apically; median length of pygidial plate much greater than basal width, only slightly narrowed apically, apex very deeply emarginate, margins carinate, surface with rather shallow, coarse and close punctures; exposed sternal plates unmodified, sternum 6 subtriangular, the apex narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Michigan to the New England states, May to August. The type locality is "Canada."

Nomada augustiana new species

FEMALE—Length 8.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks nearly as broad as eyes, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments somewhat longer than broad; mandibles slender, elongate and simple; wings subhyaline basally, becoming somewhat infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins piceous, basal vein interstitial or nearly with transverse median; tegulae very finely, closely and deeply punctate throughout; posterior margin of scutellum rather deeply grooved medially; front coxae not spined; apex of hind tibiae with 4 or 5, rather elongate

and robust, spinelike setae; labrum, base of mandibles and lateral areas of face below antennae, bright yellow, the supraclypeal area, clypeus and median portion of mandibles more testaceous; face above antennae, vertex and cheeks in part more ferruginous, a small amount of black between and above antennae, between ocelli and over posterior half of cheeks, the latter yellow in part below; antennal scape yellowish anteriorly, flagellum more brownish-testaceous; pronotal collar narrowly, tubercles, upper surface of scutellum, posterior face of propodeum in large part, and a transverse, submedian band on pleura, bright yellow; thorax otherwise dark red, but scutum with a very narrow, median, blackish line, metapleura in part and lateral areas of pronotum, black; legs largely testaceous to ferruginous, femora somewhat blackened toward base, the mid and hind coxae blackish beneath; spurs pale yellow; tegulae more testaceous; abdominal terga 1-3 with rather extensive, lateral, yellow maculae which are somewhat separated medially, those on tergum 1 submedian, rather narrow, apical impressed area and base piceous, space between the maculae more or less ferruginous; terga 2 and 3 becoming somewhat piceous apically, more or less ferruginous between and basad of the maculae; terga 4 and 5 with more submedian maculations which are little if any interrupted medially, but with small, lateral maculations which are slightly separated from the median areas; punctures deep, distinct, very close and rather coarse on face above antennae and on vertex, becoming much finer and densely crowded on cheeks below, supraclypeal area and clypeus, lateral areas below more coarsely and deeply punctate; scutum densely and rather finely rugoso-punctate, scutellum with deeper, more distinct punctures, mesopleura rather finely rugoso-punctate, propodeum finely and rather shallowly rugose posteriorly and laterally, triangle almost entirely yellow, rather smooth below, becoming rather coarsely and irregularly striate above; discs of abdominal terga very closely, finely, but quite distinctly punctate, punctures becoming more minute and widely separated toward the apical impunctate rims, tergum 1 becoming impunctate laterally and basally, tergum 4 quite broadly impunctate apically; pseudopygidium transverse, very short, forming the truncate apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence very short, thin, entirely pale where evident, slightly more copious on head and thorax below and on propodeum posteriorly, hardly evident on abdomen dorsally; sternum 5 apically with a pair of tufts of elongate, curved, brownish hairs which converge medially.

TYPE — Holotype: Female, Augusta, Richmond Co., Ga., April 1, 1959 (R. R. Snelling, on *Salix*). [author's coll.].

Nomada azaleae new species
(Fig. 107)

MALE—Length 8 mm.; lateral ocelli subequally distant from margin of vertex and each other, considerably more distant from eyes; cheeks slightly narrower than eyes; posterior margin strongly carinate; antennal scape rather strongly swollen, apex deeply excavated and largely enclosing pedicel, longer side of basal segment of flagellum somewhat shorter than segment 2, median segments only slightly longer than broad; mandibles slender and simple; wings faintly yellowish, somewhat darker along apical margin, but with a hyaline area just beyond submarginal cells, veins and stigma brownish-testaceous, with the usual three submarginal cells, 2nd considerably broader anteriorly than 3rd, basal vein slightly basad of transverse median; tegulae testaceous-hyaline, somewhat yellowish anteriorly, smooth and shining, with sparse, fine punctures; scutellum very deeply grooved medially; front coxae not spinose; hind femora unmodified; clypeus, labrum, mandibles except tips, a spot on supraclypeal area, and narrow lateral maculations ending at level of antennae, bright yellow, more ferruginous, narrow maculations surrounding top of eye, extending down the outer orbits, lower margin yellow; median area of face around antennae and extending rather broadly down to margin of clypeus, black, this extending to vertex around ocelli and down the cheeks posteriorly; antennal scape yellow anteriorly, becoming darkened posteriorly, flagella testaceous beneath, brownish-piceous above; scutum with a median, rather broad, black band, anterior margin narrowly black, each lateral third red; scutellum red except for the narrow anterior margin; pleura laterally largely red but with a small yellow anterior spot and a narrow transverse line of black just below wing bases, the venter black; tubercles and pronotal collar yellow; propodeum largely black but with a faint, reddish area on each side of posterior surface; legs testaceous in large part, hind femora more piceous, spurs pale yellow; basal abdominal tergum black over basal half, apical half more reddish, somewhat yellowish adjacent to blackened area; tergum 2 with a very broad, transverse, yellow band occupying most of disc, this narrowly interrupted medially, apical impressed area red; tergum 3 with a pair of large, lateral maculations which occupy about one-third of the plate, median

third red and apical impressed area reddish; terga 4-6 with transverse, yellow bands, those on 4 and 5 partially interrupted medially; discs of abdominal sterna 2 and 3 largely yellow, apical margins darker but rims becoming narrowly, testaceous-hyaline; head and thorax rather coarsely rugoso-punctate, but lower portion of face considerably smoother over the maculated areas, punctures very fine and barely evident; cheeks somewhat more finely rugoso-punctate; basal abdominal tergum very minutely punctate, the punctures distinctly but not widely separated, barely visible; discs of terga 2-5 very finely and quite closely punctate, punctures extending on to impressed apical areas, the rather narrow rims impunctate; pubescence very short, thin and inconspicous, entirely pale, rather copious on head below and thorax laterally and posteriorly, that on abdomen very fine, subappressed and barely evident basally, becoming more elongate and conspicuous apically; pygidial plate strongly narrowed apically, apex narrowly but quite deeply emarginate, margins carinate, surface rather coarsely but shallowly rugoso-punctate; sternum 8 with a slender, apical process; gonocoxites of genital armature as shown (fig. 107).

TYPE — Holotype: Male, Highlands, N. C., June 5, 1957 (Mitchell, on *Azalea*) [author's coll.].

Nomada (Nomada) banksi Cockerell

(Fig. 107)

Nomada vicina Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 293. ♂. (not ♀)

Nomada vicina Robertson, 1903. Canad. Ent. 35, p. 178. (not Cresson)

Nomada banksi Cockerell, 1907. Entomologist 40, p. 98. ♀.

Nomada vicina Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7.5-9 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks much broader than eyes, posterior margin carinate; longer side of basal segment of flagellum equal to segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins and stigma largely testaceous, basal vein interstitial with transverse median; tegulae shining between deep and distinct but rather fine punctures, these rather sparse and irregularly scattered; posterior margin of scutellum deeply grooved medially; front coxae with a triangular posterior tubercle, but not spined; apex of hind tibiae with 4 or 5 elongate, robust, piceous, seta-like bristles; face below ocelli almost completely ferruginous, narrowly yellow on inner orbits below, eyes completely and rather broadly encircled with ferruginous, median area of face above antennae, area around ocelli, and posterior margin of cheeks, black; antennal scape reddish-testaceous, flagellum more brownish-testaceous; tegulae yellowish-testaceous, tubercles more reddish-testaceous, the pronotal collar and scutellum ferruginous; scutum dull red along lateral margins, and with a pair of longitudinal red bands on each side of mid-line, intervening narrow stripes black; mesopleura with a narrow, transverse, bright yellow maculation, bordered above and below with rather bright ferruginous; venter in part, metapleura, and lateral faces of propodeum, black, the propodeum dull yellow on each side posteriorly, triangle black medially, reddish laterally; legs largely ferruginous, front pair somewhat yellowish, spurs pale yellow; abdominal terga blackish or piceous, with bright yellow fasciae, tergum 1 with a narrow, transverse band which is ferruginous in part, with a pair of small yellow spots on each side of center; tergum 2 with a broad, sub-basal, yellow band which is very slightly interrupted medially, rather widely removed from apical margin; tergum 3 with rather widely separated, transverse, yellow bands that are quite broad laterally, 4 with a rather narrow, transverse, yellow band which is deeply constricted at mid-line, and a pair of distinctly separated, lateral, yellow maculations; disc of tergum 5 broadly yellow medially, with a very small lateral spot on each side; abdominal sterna largely ferruginous, 3 and 4 with small, vague, yellowish spots; face above antennae very coarsely, deeply and closely punctate, almost rugose, vertex and cheeks somewhat more finely so, supraclypeal area and clypeus very finely and closely punctate, lateral areas shining, with distinct, well separated punctures; scutum and mesopleura coarsely and densely rugose, scutellum with somewhat more coarse and distinct punctures; propodeum much more finely and closely rugose, lateral faces becoming somewhat shining but still punctate below, triangle smooth but dull, becoming very finely and irregularly rugoso-striate above; discs of abdominal terga very finely, closely and quite deeply punctate, the punctures becoming somewhat more minute and more widely separated apically, tergum 1 impunctate laterally and basally, very finely but distinctly punctate medially, punctures of the

more apical terga becoming somewhat coarser and deeper apically; pseudopygidium transverse, rather short, forming the rather narrow, apical, truncate margin of tergum 5, covered apically with dense, suberect, silvery tomentum and with some very fine, suberect, more yellowish pubescence basally; pubescence very short, thin and obscure, entirely pale, rather dense on propodeum posteriorly and on venter of thorax, hardly visible on abdomen dorsally, sternum 5 apically with a pair of tufts of elongate, somewhat curved, pale bristles that converge medially.

MALE—Length 7.5-8.5 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks much narrower than eyes, posterior margin carinate; antennal scape somewhat swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated apically and in marginal cell, with a hyaline area just beyond 3rd submarginal cell, with the usual three submarginal cells, 2nd and 3rd nearly equal anteriorly, veins testaceous to piceous, basal vein interstitial with, or slightly basad of, transverse median; tegulae shining, punctures very fine but deep, distinct, rather sparse; posterior margin of scutellum deeply grooved medially; front coxae not spined; hind femora unmodified; clypeus, labrum, mandibles, a pair of narrow, lateral, facial maculae, and a narrow, yellow maculation adjacent to eye margin on cheeks below, bright yellow, the lateral maculae ending abruptly at level of antennae; face, vertex and cheeks otherwise largely black, including areas between the lateral maculae and clypeal margin below; antennal scape bright yellow anteriorly, piceous posteriorly, flagellum brownish-testaceous; tubercles and tegulae yellowish-testaceous, and pleura with a rather large, anterior, yellow maculation, thorax otherwise black; coxae black at least in part, with some yellow laterally or apically, legs otherwise largely reddish, somewhat yellowish anteriorly on front and middle legs, spurs pale yellow; abdominal terga black, with bright yellow maculae, that on tergum 1 narrow, submedian, slightly interrupted medially; tergum 2 with a pair of broad, sub-basal maculations that are much narrowed, but nearly meet medially; tergum 3 with a pair of rather widely separated but extensive, sub-basal, yellow maculations at each extreme side; tergum 4 with a transverse yellow band which is rather widely interrupted medially and deeply emarginate posteriorly on each side; tergum 5 with a somewhat similar but complete median band, and small lateral maculations, these sometimes narrowly joined; tergum 6 with a narrower but rather extensive, median, yellow band; discs of abdominal sterna 2-3 largely yellow, the broadly impressed and impunctate apical margins more reddish-hyaline; vertex and face above antennae very coarsely and densely rugose, cheeks more finely, closely and distinctly punctate below, black areas of face below closely and finely punctate, the punctures more scattered in lateral maculated areas; scutum, scutellum and mesopleura very coarsely rugose or rugoso-punctate, the propodeum somewhat more finely rugose posteriorly, becoming somewhat smoother on each side below; discs of abdominal terga with very fine, close punctures, these becoming slightly more scattered and minute apically on each plate, tergum 1 becoming impunctate laterally and basally, the more apical terga becoming rather coarsely and deeply punctate toward the impressed apical rims; pubescence very short, rather thin, somewhat yellowish above, becoming somewhat more whitish and more dense on face and thorax beneath, quite dense on venter of thorax, very fine and hardly visible on the more basal abdominal terga but more elongate on the more apical terga; sterna with very fine, suberect, scattered, pale hairs; sternum 6 becoming quite densely pale pubescent, the hairs erect along median area; median length of pygidial plate much greater than basal width, only very slightly narrowed apically, apex rather narrowly rounded, with a small median incision, margins carinate, surface quite densely rugoso-punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed apically to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION — Ontario and New York, south to southern Illinois and North Carolina, August and September.

FLOWER RECORDS—Robertson (1929) records this species (as *vicina*) on *Aster*, *Bidens*, *Eupatorium*, *Polygonum*, and *Solidago*.

This species was mistaken for *vicina* by Robertson, but the two are quite distinct. In both sexes of *vicina* the scutellum is at least partly red, and the clypeus in part black. Females of *banksi* have an entirely red clypeus, and while the scutellum also is red, it is more deeply grooved and more closely and finely punctate than in *vicina*. In the males of *banksi* the clypeus is en-

tirely bright yellow, and the scutellum either is entirely black or has a pair of small yellow spots. The gonocoxites differ in form in the two species, as shown (fig. 107). The maculation of the abdominal terga is superficially similar in the two, although minor differences are evident.

Nomada vicina stevensi Swenk (1913: Nebr. Univ. Stud. 12, p. 56), which is not known to occur east of the Dakotas, is apparently correctly associated with *vicina* as a subspecies.

Nomada capillata new species

MALE—Length 6 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks much narrower than eyes, posterior margin not evidently carinate; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, the shorter side not much more than half the length of segment 2, median segments nearly as broad as long; mandibles slender and simple; wings hyaline basally, becoming faintly infuscated at apex and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins and stigma testaceous, basal vein slightly basad of transverse median; tegulae shining, punctures very fine, rather sparse toward outer margin; posterior margin of scutellum very slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles basally, and very narrow, lateral, facial maculae, bright yellow; face, vertex and cheeks otherwise black; antennal scape bright yellow anteriorly, becoming more piceous posteriorly, flagella entirely testaceous; tubercles, tegulae, and two nearly contiguous spots on scutellum, yellow, and mesopleura with a very small yellow spot anteriorly; thorax otherwise black; abdominal tergum 1 piceous across basal half, apical half reddish-testaceous; terga 2 and 3 testaceous medially, with extensive, lateral, widely separated, yellow maculations, apical impressed areas becoming somewhat darkened, rims narrowly yellowish-hyaline; terga 4-6 dark, not maculated, yellowish-hyaline apically; abdominal sterna largely piceous, with yellowish-hyaline apical margins; vertex and upper half of face coarsely and quite deeply rugoso-punctate, cheeks much more finely so, and punctures rather fine on lower half of face, lateral maculated areas almost impunctate, clypeus with very minute, close and obscure punctures; scutum, scutellum and mesopleura densely rugose, propodeum somewhat more finely so, triangle almost completely and coarsely reticulate or irregularly striate; discs of abdominal terga with exceedingly minute, barely visible and slightly separated punctures, the depressed apical rims invaded in part by scattered, sparse and minute punctures; pubescence entirely pale, quite short but rather copious on head and thorax, largely hiding surface on thorax below, barely evident on abdomen dorsally and ventrally; sternum 6 becoming rather densely pubescent toward apex; median length of pygidial plate about equal to basal width, elongate triangular in form, apex much narrowed and quite narrowly but deeply emarginate, margins carinate, surface very finely and closely punctate; exposed sternal plates unmodified, (sternum 8 and genital armature missing).

TYPE—Holotype: Male, Milton, Mass., May 4, 1902 [M.C.Z.].

Nomada (Nomada) ceanothi Cockerell
(Fig. 107)

Nomada (Nomada) ceanothi Cockerell, 1907. Entomologist 40, p. 97. ♀.

FEMALE—Length 6-7 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin only obscurely carinate at most; longer side of basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming lightly infuscated apically, with a hyaline area just beyond submarginal cells, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining, punctures exceedingly minute, sparse and obscure, becoming somewhat closer along inner margin; posterior margin of scutellum rather broadly and shallowly impressed medially; front coxae not spinose; apex of hind tibiae with three or four very slender, elongate, yellowish, hair-like bristles; eyes narrowly but almost completely encircled with reddish-testaceous, lower half of face largely of the same color, with a small amount of black immediately beneath each antenna, the broad, median area above antennae, vertex and cheeks largely black; antennal scape and base of flagellum more testaceous, following segments more brownish-testaceous beneath, somewhat reddish above; scutum and scutellum ferruginous, scutum narrowly black anteriorly and in mid-line, mesopleura black beneath and below wing

base, yellowish-ferruginous medially, with a smaller, more reddish spot just below wing base; metapleura and propodeum largely black, propodeum with an obscure yellowish spot on each side of posterior face; pronotal collar, tubercles, tegulae, and legs in large part, testaceous, spurs pale yellow; discs of abdominal terga 1-5 reddish-testaceous, tergum 1 black across basal third, terga 2 and 3 with lateral, widely separated, yellow maculae, tergum 5 with a pair of vague, subapical, yellow infusions; abdominal sterna largely reddish-testaceous; face, vertex and cheeks coarsely, closely and deeply punctate, cheeks becoming somewhat more rugose below, clypeus with very minute, fine, close and obscure punctures; scutum and upper portion of mesopleura very coarsely and deeply rugoso-punctate, pleura more distinctly and finely punctate below, scutellum with somewhat finer but rather coarse and contiguous punctures; propodeum more finely but densely rugose, triangle narrowly smooth below, becoming broadly and coarsely rugoso-striate across upper two-thirds; discs of abdominal terga very finely and rather closely punctate, tergum 1 becoming impunctate laterally and basally, and the median punctures very minute and obscure, apical margin broadly impunctate; apical margins of terga 2-4 very broadly impressed, becoming more or less hyaline along rims, these invaded only very slightly by a few very minute, scattered punctures, those of tergum 5 becoming rather sparse but somewhat coarser toward the apex; pseudopygidium very short, transverse, forming the truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short and obscure in large part, entirely pale where visible, somewhat more copious and evident on face, cheeks below, on thorax laterally and beneath, and on propodeum, very minute and obscure on abdomen dorsally, sternal plates with somewhat more elongate but sparse, pale hairs, apex of sternum 5 with a rather small tuft of somewhat elongate, more or less brownish, convergent hairs on each side of mid-line.

MALE—Length 5-7 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin obscurely carinate, if at all; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, its shorter side only about half the length of segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins testaceous, basal vein much basad of transverse median; tegulae shining, punctures exceedingly minute and sparse, evident chiefly along inner margin; posterior margin of scutellum very broadly and slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, supraclypeal area, and narrow, lateral, facial maculations, bright yellow, and cheeks narrowly yellow along margin of eye below; face above antennae, vertex and cheeks black, and black separating the supraclypeal maculation from the narrow lateral maculations which end narrowly on eye margin at level of antennae; antennal scape yellow anteriorly, piceous posteriorly, flagellum more brownish-testaceous beneath, upper surface darkened, piceous basally, becoming lighter apically; pronotal collar, tubercles, tegulae, and an anterior maculation on mesopleura, bright yellow; scutellum red, but anterior margin and remainder of thorax black; coxae and trochanters in part blackish, legs otherwise more testaceous, hind femora somewhat infuscated, spurs pale yellow; basal half of abdominal tergum 1 piceous, apical half more yellowish-ferruginous, terga 2 and 3 with extensive, lateral, yellow maculations which are rather widely separated medially, the non-maculated areas more testaceous or ferruginous, terga 4 and 5 with narrower, transverse bands which are interrupted both laterally and medially, and tergum 6 broadly yellow medially; abdominal sterna largely reddish-testaceous, sternum 6 narrowly yellow at apex; face, vertex and cheeks coarsely, and deeply rugoso-punctate, punctures becoming somewhat finer and more sparse on each side below, clypeus with very minute, close and obscure punctures; scutum very coarsely and deeply rugose, scutellum somewhat more finely rugoso-punctate, and mesopleura rugose above, punctures becoming somewhat more distinct but still close below; propodeum somewhat more finely but densely rugose, triangle somewhat shining below, upper two-thirds becoming rather coarsely, irregularly striate; discs of abdominal terga very finely and quite closely punctate, tergum 1 becoming impunctate basally and laterally, apical impressed areas of the following terga invaded with minute, rather sparse punctures, only the more or less yellowish-hyaline apical rims being impunctate; terga 4-6 rather coarsely and deeply punctate apically; pubescence entirely whitish, very short and inconspicuous on head and thorax above, becoming somewhat more copious but still short on face below and lower portions of head, on thorax laterally, posteriorly and beneath; abdomen very minutely and obscurely pubescent above, sternal plates

with very fine, sparse but more elongate, pale hairs, sternum 6 becoming quite densely pubescent apically; median length of pygidial plate about equal to basal width, slightly narrowed apically, apex somewhat rounded but deeply incised, margins carinate, surface quite closely and rather finely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—New York to North Carolina, March to July.

FLOWER RECORDS — *Amelanchier, Aruncus, Ceanothus* and *Senecio.*

Nomada composita new species

FEMALE—Length 7-10 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin sharply carinate; longer side of basal segment of flagellum somewhat shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally, becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, a hyaline area just beyond the 3rd, veins testaceous to piceous, stigma testaceous, basal vein much basad of transverse median; tegulae shining, punctures minute and sparse, somewhat closer along inner margin; posterior margin of scutellum only slightly depressed medially; front coxae not spinose; apex of hind tibiae with a row of three, of four short but rather robust, seta-like bristles; head and thorax largely ferruginous, face somewhat more testaceous below, a restricted area of black just above antennae, this extended narrowly below to lateral margin of clypeus, area between ocelli and posterior half of cheeks black; antennal scape and base of flagellum testaceous, flagellum otherwise testaceous beneath, somewhat brownish above; tubercles and tegulae more testaceous, scutum with a narrow, median, black line, pronotum laterally, mesopleura beneath, metapleura, and adjacent lateral surfaces of propodeum, black; posterior face of propodeum including the triangle largely ferruginous; front and middle coxae largely black, the hind coxae ferruginous, trochanters reddish-testaceous, femora rather narrowly piceous at base, becoming more testaceous apically, tibiae and tarsi testaceous, spurs pale yellow, the hind basitarsi somewhat darkened; tergum 1 of abdomen piceous over basal half, otherwise ferruginous, becoming somewhat darkened along rim, remaining terga ferruginous in large part, tergum 2 with a pair of widely separated, lateral, yellow maculae, tergum 3 with a similar but much smaller pair, terga 4 and 5 not maculated, sterna reddish-testaceous, more or less suffused with piceous; vertex and face above antennae coarsely, deeply, and quite closely rugoso-punctate, cheeks becoming more finely, shallowly and obscurely below; lower half of face distinctly and rather coarsely punctate on each side, the supraclypeal area finely and densely rugose, and clypeus with very fine and close punctures; scutum coarsely and deeply rugoso-punctate; punctures of scutellum deep and distinct, not quite as coarse; pleura coarsely reticulate above, becoming somewhat more distinctly and irregularly punctate beneath; propodeum finely and densely rugose, lateral faces becoming somewhat smoother below, triangle smooth over lower half, becoming rather coarsely striate along upper margin, median striations finer and rather vague; abdominal tergum 1 becoming impunctate laterally and basally, median punctures barely evident, discs of following terga minutely and rather closely punctate, apical margins rather broadly impunctate, invaded only slightly by very minute, scattered punctures, tergum 5 becoming somewhat more coarsely and irregularly punctate apically; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely covered with rather yellowish, suberect tomentum; pubescence very short and inconspicuous, largely pale, face with a few rather short but erect hairs, with rather dense pubescence on propodeum posteriorly, that on abdomen dorsally hardly evident, becoming somewhat more conspicuous laterally on the more apical terga; sterna with very sparse, scattered, somewhat more elongate, pale hairs, apex of sternum 5 with a pair of tufts of erect, curved, brownish hairs that converge medially.

TYPES—Holotype: Female, Colebrook, Conn. (no other data) [M.C.Z.]. Paratypes: 4 ♀♀, topotypical; 1 ♀, Presque Isle, Marquette, Mich., July 9, 1939. The Colebrook series was probably collected by W. M. Wheeler.

Paratypes are in the Museum of Comparative Zoology and in collections of R. R. Dreisbach and the author.

Nomada (Nomada) cressonii Robertson
(Fig. 107)

Nomada cressonii Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 275. ♀ ♂.
Nomada mera Cockerell, 1908. Ent. Soc. Wash. Proc. 10, p. 83. ♀. New synonymy
Nomada mera Cockerell, 1911. U. S. Natl. Mus. Proc. 41, p. 239. ♂ ♀.
Nomada cressonii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-10 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; longer side of basal segment of flagellum somewhat shorter than segment 2 which is much elongated, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated along narrow outer margin and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, veins piceous, basal vein much basad of transverse median; tegulae shining between very minute, quite sparse punctures; posterior margin of scutellum only slightly impressed medially; front coxae not spinose; apex of hind tibiae with 3 or 4 slender, elongate, yellowish, hair-like bristles; face largely ferruginous, lower half somewhat more testaceous, labrum bright yellow around basal and lateral margins, a restricted black area between and slightly above antennae, another between ocelli, and posterior half of cheeks black, the eyes completely encircled with reddish-testaceous; antennal scape reddish-testaceous, flagellum more brownish-testaceous below, dull ferruginous above; thorax in large part ferruginous, tegulae somewhat more yellowish-ferruginous; prothorax laterally, mesopleura below, metapleura and narrow adjacent margin of propodeum, and median lines on scutum and on posterior face of propodeum, black; legs largely testaceous, front and mid femora darkened at base, hind femora largely dark, spurs pale yellow; abdominal terga largely ferruginous, basal tergum narrowly piceous at base, terga 2 and 3 with large, lateral, yellow maculae that are widely separated medially, tergum 5 with a pair of subapical, slightly separated, yellow maculations, impressed apical margins of all quite broadly impunctate, somewhat more yellowish; abdominal sterna piceous in large part, becoming somewhat more testaceous on the more apical sterna; vertex and face above antennae very coarsely, closely and deeply punctate, cheeks becoming somewhat more rugose, lower part of face coarsely and deeply punctate at each side, but supraclypeal area and clypeus with very fine, close, shallow and rather obscure punctures; scutum and scutellum very coarsely, deeply and closely punctate, the mesopleura more rugose, punctures becoming somewhat more distinct below; propodeum posteriorly rather finely, obscurely and shallowly rugose, lateral faces becoming somewhat smoother below; discs of abdominal terga finely and rather closely and deeply punctate toward base, punctures becoming more minute and sparse toward the broad, apical, impunctate margins; basal tergum becoming impunctate laterally and basally, very minutely punctate medially; tergum 6 becoming rather sparsely, coarsely and deeply punctate toward apical rims; pseudopygidium transverse, very short forming the rather broadly truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short and thin, entirely whitish, somewhat more copious on thorax laterally and posteriorly, very fine and obscure on abdomen, apex of sternum 5 with a dense patch of elongate, curved and convergent, fuscous hairs on each side.

MALE—Length 7-9 mm.; lateral ocelli very slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin not distinctly carinate; antennal scape only slightly swollen, apex deeply excavated and largely enclosing pedicel, basal segment of flagellum in front only half the length of segment 2, median segments somewhat longer than broad, 3-5 slightly swollen beneath; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd usually somewhat broader than 3rd anteriorly, but these sometimes equal, veins largely piceous, basal vein much basad of transverse median; tegulae shining between very minute, sparse punctures; posterior margin of scutellum quite deeply impressed medially; front coxae not spinose; hind femora slender and unmodified; face below antennae largely yellow, median area of face above antennae and around ocelli, black, narrowly ferruginous around margin of eye above and posteriorly, becoming narrowly yellow on cheeks below, cheeks medially and posteriorly black;antennal scape bright yellow anteriorly, narrowly piceous posteriorly, flagellum brownish-testaceous; tubercles and tegulae more yellowish; pronotum black, the collar testaceous; mesopleura largely ferruginous above, black below, the scutum with a median, rather broad, black area, otherwise ferruginous; scutellum entirely ferruginous,

the metapleura and propodeum largely black; legs testaceous in large part, front and mid legs more or less yellowish anteriorly and their tarsi yellow, hind basitarsi more brownish, all spurs pale yellow; abdominal terga reddish-testaceous in part, tergum 1 blackish toward base, apical margin more ferruginous, 2 and 3 with broad, transverse, sub-basal bands that are slightly interrupted medially, apical areas more ferruginous, 4 with rather widely separated, lateral, yellow maculae, the median area more piceous, the broad depressed rim somewhat yellowish-hyaline, 5 and 6 rather broadly yellow medially, apical rims yellowish-hyaline; discs of abdominal sterna yellowish to testaceous, the broad, impunctate, apical rims more testaceous, sternum 6 bright yellow medially toward apex; vertex and face above antennae very coarsely, deeply and closely punctate, the cheeks becoming more finely rugose below, lower part of face rather deeply punctate on each side, and punctures of supraclypeal area rather coarse and very close; clypeus very finely and closely punctate beneath rather dense pubescence; scutum, scutellum and mesopleura very coarsely rugoso-punctate, posterior face of propodeum somewhat more finely rugose, lateral faces becoming somewhat smoother below, propodeal triangle smooth and somewhat shining below, becoming rather coarsely but irregularly rugoso-striate above; discs of abdominal terga very finely, closely and rather shallowly punctate, basally the punctures becoming somewhat more minute, but invading apical margins nearly to the rims, tergum 1 impunctate laterally and basally, 4-6 becoming somewhat more coarsely and sparsely punctate toward the depressed apical rims; pubescence rather copious over head and thorax, rather short but entirely white, quite dense on face, on cheeks below, on thorax laterally and below, very fine and obscure on abdomen, becoming somewhat more elongate on the more apical terga, more elongate but very fine and sparse on sterna, becoming quite dense at apex of sternum 6; median length of pygidial plate about equal to basal width, rather strongly narrowed to the apex which is very deeply incised, margins carinate, surface closely and rather finely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION — North Dakota to Nova Scotia, south to Tennessee and North Carolina, April to August.

FLOWER RECORDS — *Azalea, Oenothera, Rubus* and *Senecio*. This is recorded by Robertson (1929) on *Antennaria, Claytonia, Dentaria, Erigeron, Nothoscordum, Oxalis, Salix, Smilacina, Taenidia, Viburnum* and *Zanthoxylum*.

There is either a considerable range of variation in *cressonii*, or more than a single species is included in the material at hand. The differences involve the relative lengths of the antennal segments, the relation of the basal vein to the transverse median vein, and the extent of red coloration of the thorax. Both sexes show much the same variations, but there is no correspondance of these variations with distribution and sex.

Nomada crudelis Cresson

Nomada crudelis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 82. ♀.

FEMALE—Length 15 mm.; lateral ocelli nearer margin of vertex than to eyes; cheeks subequal to eyes in width; longer side of basal segment of flagellum slightly shorter than segment 2, median segments slightly longer than broad; mandibles simple, robust; wings pale fuliginous, veins brownish, 3rd submarginal cell subequal to 2nd anteriorly, basal vein somewhat basad of transverse median; tegulae closely and quite coarsely punctate; scutellum deeply grooved medially; front coxae not spinose; apex of hind tibiae with a row of three or four very short bristles; color largely red, mandibles and labrum more yellowish, segments 2-11 of flagella brownish-piceous; scutum with three rather faint, longitudinal blackish lines; pronotum laterally, metapleura below, and lower, anterior margin of propodeum laterally, black; legs entirely red, spurs yellowish; basal half of abdominal tergum 1 black, abdomen otherwise red, but impressed apical margins of 2-4 yellowish; vertex and upper half of face rather coarsely rugose, cheeks finely so; clypeus minutely and closely punctate; thorax rather coarsely rugose throughout, but lower half of propodeal triangle smooth and dull; punctures of abdominal terga minute, and very closely crowded, only the very narrow, apical rims impunctate; pseudopygidium of the usual form; pubescence very short and inconspicuous, pale yellowish.

TYPE LOCALITY—Georgia.

It seems possible that *Andrena obscuripennis* Smith is the host of *crudelis*.

No specimens other than the type have been seen. In the Catalog of Hymenoptera

(p. 1198) this is listed in the subgenus *Heminomada*, but it bears little or no resemblance to the other species of that group. There are no yellow bands on the abdominal terga, and the yellowish impressed apical areas of the terga are quite obscure.

Nomada decepta new species

FEMALE—Length 8 mm.; lateral ocelli much nearer margin of vertex than to each other, more distant from eyes; cheeks slightly narrower than eyes, hind margin obscurely carinate; longer side of basal segment of flagellum equal to segment 2, median segments somewhat longer than broad; mandibles slender and simple; wings brownish-hyaline, veins and stigma more testaceous, 1st transverse cubitus missing, thus with but two submarginal cells, the 2nd strongly narrowed apically, (resembling *obliterata*, fig. 106) basal vein interstitial or nearly with transverse median; tegulae testaceous-hyaline, smooth and shining, very minutely and sparsely punctate; scutellum with a deep median groove; front coxae not spinose; apex of hind tibiae with 2 or 3 short, spine-like setae; head and thorax largely red, clypeus, labrum and mandibles somewhat yellowish, area surrounding ocelli black; antennae testaceous, scape somewhat more yellowish; scutum, scutellum and mesopleura red, scutum with or without a narrow median black line; prothorax laterally, metapleura, adjacent lateral areas of propodeum, and propodeal triangle, black; posterior face of propodeum reddish-yellow on each side; tubercles yellowish; legs largely testaceous, spurs pale yellow; abdomen almost entirely red, apical margins of the terga becoming narrowly yellowish-hyaline; abdominal sterna somewhat darker toward base, the broad apical margins yellowish-hyaline; punctures of head and thorax coarse, close and deep, but somewhat finer on lower half of face, more or less separated and rather shallow on clypeus, those on scutellum very coarse and well separated, each half with only a few, deep, rounded punctures that are much more coarse than those on scutum and on posterior face of scutellum; punctures on pleura very coarse but rather shallow, contiguous, somewhat finer and densely crowded on propodeum, but the triangle largely impunctate, with a few coarse striations toward upper margin; punctures on abdominal terga very fine and close, invading somewhat more sparsely the apical impressed areas, nearly reaching rims; pseudopygidium very narrow, of the usual form; pubescence very short, thin and obscure, entirely pale, somewhat more elongate on cheeks and lower part of head and on pleura and propodeum, very short, inconspicuous and sub-appressed on abdomen.

TYPES—Holotype: Female, Alabama, N. Y., May 30, 1951 (L. L. Pechuman) [U.S.N.M.]. Paratype: 1 ♀, Midland Co., Mich., May 15, 1955 (Dreisbach) [Dreisbach].

Nomada (Nomada) denticulata Robertson

(Fig. 107)

Nomada articulata Robertson, 1895. (not Smith). Amer. Ent. Soc. Trans. 22, p. 124. ♂.

Nomada bella Robertson, 1897. (not Cresson). Acad. Sci. St. Louis, Trans. 7, p. 340. ♀.

Nomada articulata Robertson, 1898 (not Smith). Acad. Sci. St. Louis, Trans. 8, p. 51. ♀.

Nomada denticulata Robertson, 1902. Canad. Ent. 34, p. 49.

Nomada simplex Robertson, 1902. Ent. News 13, p. 80. New synonymy.

Nomada denticulata Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7-8 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin strongly carinate; longer side of basal segment of flagellum equal to segment 2, median segments slightly longer than broad; mandibles simple; wings subhyaline basally, becoming rather deeply infuscated along outer margin and in marginal cell, with a hyaline area just beyond the submarginals, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins piceous, basal vein much basad of transverse median; tegulae shining between deep, distinct, quite close punctures; posterior margin of scutellum deeply impressed medially; front coxae with triangular, posterior, spine-like tubercles; apex of hind tibiae with two or three long, yellowish, hair-like bristles; head and thorax largely ferruginous, but face somewhat more testaceous, with a small amount of black between antennae, between ocelli, and along posterior margin of cheeks; tubercles, tegulae and legs more testaceous; scutum with a median black line, and metapleura and adjacent anterior margin of propodeum, black; spurs pale yellow; discs of abdominal terga ferruginous, basal tergum narrowly blackish or piceous at base and along apical margin, terga 2-4 more or less piceous apically, 2 and

3 with lateral, widely separated, yellow maculae; antennal scape and base of flagellum more testaceous, following segments ferruginous beneath, more piceous above; punctures of face above antennae very coarse, deep and close, becoming somewhat finer on vertex, shallow but quite coarse and close on each side of face below, cheeks more coarsely rugose, supraclypeal area more finely rugoso-punctate, the clypeus finely and shallowly punctate; scutum coarsely rugoso-punctate medially, becoming somewhat more finely so laterally, the scutellum and pleura quite coarsely rugoso-punctate above, punctures becoming somewhat more distinct and finer on pleura below; propodeum rather finely rugose posteriorly, becoming very finely so on each lateral surface, triangle smooth and somewhat shining below, becoming quite coarsely striate on each side above, more finely reticulate medially; discs of abdominal terga very finely and rather closely punctate, apical impressed areas largely impunctate, invaded only slightly by very minute, sparse punctures, tergum 1 becoming impunctate basally and laterally; punctures of tergum 5 somewhat more coarse and distinct, well separated apically; pseudopygidium very short, transverse, forming the rather narrowly truncate apical margin of tergum 5, densely clothed with suberect silvery tomentum; pubescence very short, inconspicuous, somewhat more elongate on cheeks below and on pleura and propodeum, entirely pale where visible, hardly evident on abdomen dorsally, somewhat more elongate but very fine and sparse on abdominal sterna; sternum 5 with a dense, transverse tuft of elongate, brownish, convergent hairs on each side of mid-line apically.

MALE—Length 7-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks much narrower than eyes, posterior margin quite strongly carinate; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, longer side of basal segment of flagellum equal to segment 2, median segments only very slightly longer than broad, each of segments 2-7 with a basal depression above, resulting in a tuberculate appearance of the apex; mandibles rather robust, entirely simple; wings subhyaline basally, becoming rather deeply infuscated apically and in marginal cell, a hyaline area just beyond the submarginals, with the usual three submarginal cells, 2nd somewhat broader anteriorly than 3rd, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining, punctures fine but close, deep and distinct throughout; posterior margin of scutellum quite deeply depressed medially; front coxae with posterior, triangular, spine-like tubercles; hind femora quite slender and unmodified; clypeus, labrum, mandibles, narrow lateral facial maculae ending rather abruptly at level of antennae, and supraclypeal area medially, bright yellow, and cheeks with a narrow, yellow band along margin of eye below; face above, vertex and cheeks otherwise black, the black area reaching lateral margins of clypeus below; antennal scape bright yellow anteriorly, becoming more ferruginous posteriorly, flagellum more brownish-testaceous beneath, piceous above; pronotal collar and a rather large maculation on pleura, bright yellow, pleural maculation bordered above and below with ferruginous; scutum and scutellum ferruginous, with a rather broad, median, black band on scutum; propodeum and metapleura largely black, the mesopleura becoming black beneath; tubercles and tegulae more testaceous; tergum 1 of abdomen, piceous basally and very narrowly piceous across apical margin, more ferruginous medially, with a small yellow maculation on each side; disc of tergum 2 ferruginous medially, with a large yellow maculation on each extreme side, apical margin becoming somewhat darker; terga 3-6 with more or less complete, transverse, yellow bands, these sub-basal or median on 2 and 3, more nearly apical on 5, narrowly interrupted medially on 3, becoming very broad at each extreme side, and broad on 4 laterally, posterior margins of the bands more or less emarginated on each extreme side; discs of abdominal sterna 2-4 more or less yellow medially, tergum 1 largely ferruginous, the more apical terga becoming more piceous apically, but tergum 6 largely testaceous; legs largely testaceous, hind femora more ferruginous, with piceous infusions, spurs pale yellow; punctures coarse, deep and close on face above antennae, somewhat shallower but quite coarse and very close below, very fine, close and shallow on clypeus; vertex posteriorly very closely and coarsely punctate, punctures becoming somewhat more sparse toward eyes, cheeks much more finely rugose; scutum, scutellum and mesopleura coarsely rugoso-punctate, punctures becoming somewhat more distinct on mesopleura below; propodeum posteriorly somewhat more finely rugose, becoming smoother on each side toward metapleural margin, triangle rather smooth below, becoming rather finely reticulate above medially, coarsely but narrowly striate on each side; discs of abdominal terga very finely and rather closely punctate, punctures sparsely invading the broad, impressed, apical margins nearly to the rims, tergum 1 becoming impunctate laterally and basally, terga 5 and 6 becoming more coarsely and sparsely punc-

tate apically; pubescence entirely pale, very short, somewhat more copious on face and on thorax laterally, posteriorly and beneath, barely evident on abdomen dorsally, sternal plates with more sparse but elongate, fine, pale hairs, sternum 6 becoming quite densely short pubescent apically; median length of pygidial plate hardly equal to basal width, slightly narrowed apically, apex broadly truncate and slightly emarginate, margins carinate, surface with rather close but distinct, fine punctures; exposed abdominal sterna unmodified, sternum 6 subtriangular, apex narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to New York, south to Georgia, March to May.

FLOWER RECORDS—*Crataegus, Prunus, Rubus, Salix* and *Stellaria*. Robertson (1929) records this species on *Amelanchier, Cardamine, Cercis, Erigeron, Geranium, Ribes, Taenidia, Taraxacum, Thaspium, Zanthoxylum* and *Zizia*.

It seems doubtful that there is any real difference between *denticulata* and *simplex* Robertson. In Robertson's key (1903) the males are separated by the color of the abdomen, but there is considerable variation in this character and is thus unreliable. The short, triangular coxal spines of *denticulata* are included as a key character, but these vary in the relative degree of development, and are very poorly developed in a specimen that has been compared with the lectotype specimen and thought to be identical with it. The females Robertson associated with these males may or may not be correctly associated. There is need for a re-study of the Robertson material, but of more significance yet is the collection of a good series of both sexes from the nesting site of its unknown *Andrena* host.

Nomada (Nomada) depressa Cresson

Nomada depressa Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 302. ♀.

Nomada depressicauda Cockerell, 1908. Ent. News 19, p. 323. ♀. New synonymy

FEMALE—Length 6-12 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly as broad as eyes, posterior margin rather strongly carinate; longer side of basal segment of flagellum somewhat shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings faintly yellowish at base, becoming somewhat more deeply infuscated at apex and in marginal cell, with the usual three submarginal cells, a hyaline area just beyond the 3rd, 2nd much broader anteriorly than 3rd, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae shining between rather fine but deep and distinct punctures, these rather close along inner margin, becoming very sparse along outer margin; posterior margin of scutellum quite deeply impressed medially; front coxae not spinose; apex of hind tibiae with a row of three or four rather short but stout, spine-like bristles; head and thorax ferruginous, with varying amounts of black between antennae, between the ocelli, along posterior margin of cheeks, mesopleura laterally and beneath, metapleura, mid coxae and adjacent areas of propodeum; legs chiefly ferruginous, the femora more or less piceous basally, spurs pale yellow; abdominal terga ferruginous in large part, tergum 1 with the basal third piceous, 2 and 3 with large, lateral, yellow maculations that are widely separated medially, 4 with a pair of much smaller, sublateral maculations that are nearer to each other than to the extreme lateral margins of the tergum, and 5 with a broad but rather short yellow patch bordering the pseudopygidium; face and vertex rather coarsely and closely rugoso-punctate, cheeks becoming very finely so below, supraclypeal area and clypeus with very fine, closely crowded and rather shallow punctures; scutum and scutellum quite densely and not very coarsely rugoso-punctate, mesopleura somewhat more coarsely rugose above, punctures becoming more distinct but still quite close below; propodeum very finely and densely rugose, triangle rather smooth but dull below, becoming rather broadly rugoso-striate across upper margin; discs of abdominal terga very finely and rather closely punctate, tergum 1 impunctate basally and laterally, and the apical margin narrowly impunctate, depressed apical rims of 2-4 only partially invaded by very minute, scattered punctures; pseudopygidium extremely large, its median length about half that of the entire plate, basal margin strongly arched, apical margin truncate, surface quite smooth, densely clothed with extremely minute, silvery tomentum which is visible only at certain angles; pubescence pale in general but some of hairs on face and on vertex laterally rather dark and erect, otherwise very thin and short, hardly visible on abdomen dorsally, very short, thin and sparse on sternal plates; apex of sternum 5 with a transverse row of piceous, convergent hairs on each side of midline.

DISTRIBUTION—Michigan to Maine, south to North Carolina, April to August.

FLOWER RECORDS—*Azalea* and *Rubus*.

Nomada detrita new species
(Figs. 106 & 107)

MALE—Length 8 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; antennal scape very slightly swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum very much shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple, outer margin slightly angulate medially; wings slightly yellowish, becoming somewhat more distinctly clouded apically and in marginal cell, with but two submarginal cells (fig. 106), 1st recurrent vein interstitial with 1st transverse cubitus, veins testaceous, stigma somewhat more reddish, basal vein interstitial with transverse median; tegulae rather dull, punctures shallow and obscure, sparse toward outer margin; posterior margin of scutellum rather deeply depressed medially; front coxae not spinose; hind femora simple and unmodified; clypeus, labrum, mandibles, narrow lateral facial maculations ending very narrowly on eye margin at level of antennae, and antennal scape anteriorly, bright yellow; face, vertex and cheeks otherwise black; basal segment of flagellum somewhat yellowish, flagellum otherwise testaceous beneath, more brownish-piceous above, tubercles and tegulae testaceous, thorax otherwise black; coxae and trochanters in large part black, femora piceous basally, becoming somewhat testaceous apically and above, tibiae more testaceous, the tarsi yellowish, and spurs pale yellow; basal abdominal tergum largely piceous, becoming infused with ferruginous apically, discs of terga 2-4 largely yellow, very slightly interrupted medially by a reddish line, abruptly piceous laterally, apical impressed areas more reddish-piceous; terga 5 and 6 blackish basally, with some vague, subapical, yellowish areas, apical margins obscurely yellowish-hyaline; abdominal sterna largely piceous, apical margins more or less yellowish-hyaline; face, vertex and cheeks above rather coarsely and deeply rugose, cheeks becoming somewhat more finely and shallowly so below, punctures of lower part of face laterally somewhat more distinct, supraclypeal area rather finely rugose, clypeal punctures very fine, close, shallow and obscure, the lateral maculated areas with only a few, widely scattered punctures; scutum, scutellum and pleura quite coarsely rugose, pleura somewhat more distinctly and deeply punctate below; propodeum rather shallowly rugose, triangle smooth, but dull and tessellate below, becoming reticulate above medially, striate on each side; discs of abdominal terga exceedingly minutely punctate, the punctures barely visible, quite close, tergum 1 becoming impunctate laterally and basally, depressed apical margins invaded by minute, close punctures nearly to rims; pubescence entirely whitish, rather short but erect, rather copious on head and thorax but not hiding surface, very fine, barely visible on abdomen dorsally, sternal plates with more sparse and elongate pale hairs, sternum 6 becoming rather densely short pubescent at apex; median length of pygidial plate somewhat greater than basal width, only slightly narrowed apically, apex subtruncate, slightly incurved medially, hardly emarginate, margins carinate, surface very finely and closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

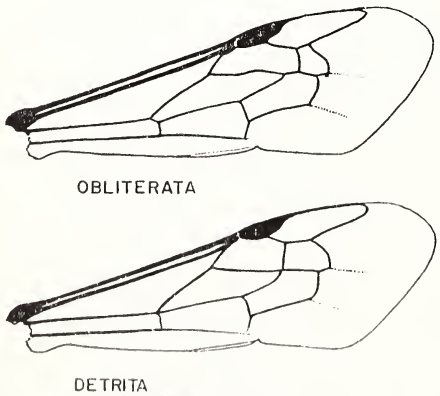


Figure 106
Venation of front wing of *Nomada obliterata* and *N. detrita*.

TYPE—Holotype: Male, Randolph, N. H., June 25, 1930 [M.C.Z.].

Nomada dreisbachi new species

MALE—Length 8-9 mm.; lateral ocelli much nearer margin of vertex than to each other, slightly nearer each other than to eyes; cheeks considerably narrower than eyes, not distinctly carinate posteriorly; antennal scape somewhat swollen, apex deeply excavated and largely enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments considerably longer

than broad; mandibles slender and simple; wings subhyaline, becoming narrowly infuscated apically, veins and stigma brownish-testaceous to piceous, with the usual three submarginal cells, 2nd very much broader anteriorly than 3rd, basal vein slightly basad of transverse median; tegulae yellowish-hyaline, shining and nearly impunctate; scutellum rounded, without a distinct median groove; front coxae not spined; hind femora unmodified; clypeus, labrum and mandibles yellow, and lateral face marks yellow ending narrowly on eye margin at level of antennae, head otherwise black; antennal scape yellow anteriorly, piceous posteriorly, flagellum testaceous beneath, more brownish above; thorax largely black, tubercles yellowish, pleura with a small anterior yellow maculation, scutellum ferruginous posteriorly; legs largely yellowish-testacous, hind femora largely piceous except toward apex, spurs pale yellow; basal abdominal tergum black across basal half, apical half yellowish-ferruginous; terga 2-5 with broad, transverse, yellow bands, these very narrowly interrupted by a red line on 2-4, apical areas more ferruginous; sterna ferruginous, each somewhat darker apically; head and thorax rather coarsely rugoso-punctate, but maculated areas of face more obscurely and finely sculptured; propodeum rather finely rugoso-punctate laterally, triangle of posterior face rather smooth below, becoming coarsely rugoso-reticulate along upper margin; punctures of abdominal terga minute and rather close, becoming somewhat more sparse and minute on impressed apical margins, rims narrowly impunctate; pubescence quite short but rather copious, faintly yellowish on head and thorax above, becoming white laterally and below, very thin and sparse on abdominal terga; pygidial plate narrow and elongate, tip narrowly but deeply incised, margins carinate, surface rather coarsely rugoso-punctate; sternum 8 with a slender apical process; gonocoxites of genital armature similar to *bethunei* (fig. 105).

TYPES—Holotype: Male, Newago Co., Mich., May 13, 1956 (R. & K. Dreisbach) [author's coll.]. Paratypes: MAINE: 1 ♂, Orono, May, 1936. MASSACHUSETTS: 1 ♂, Randolph, May 12, 1901 (Percy Gardner Bolster coll.). MICHIGAN: 2 ♂♂, Midland Co., May 4 & 8, 1943; 1 ♂, Kent Co., April 20, 1946; 1 ♂, Osceola Co., May 3, 1952.

Paratypes are in collections of the University of Maine, the Museum of Comparative Zoology, R. R. Dreisbach and the author.

Nomada (Nomada) florilega Lovell and Cockerell

Nomada (Nomada) florilega Lovell and Cockerell, 1905. Psyche 12, p. 41. ♀.

FEMALE—Length 7-8 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin rounded; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad; mandibles simple; wings lightly infuscated, becoming somewhat more deeply so along apical margin and in marginal cell, with a hyaline area just beyond the submarginal and discoidal cells, with the usual three submarginal cells, 2nd considerably broader anteriorly than 3rd which is very strongly narrowed, veins and stigma piceous, basal vein considerably basad of transverse median; tegulae shining, punctures very fine, rather close along inner margin, becoming very sparse and minute along outer margin; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; apex of hind tibiae with only one or two very slender but elongate, inconspicuous bristles; clypeus, labrum and mandibles reddish-testaceous, eyes narrowly bordered with ferruginous, very narrowly along inner orbits but reaching lateral ocelli above, median area of face from clypeal margin to anterior ocellus, black; cheeks largely black, but narrowly ferruginous along margin of eye; antennal scape reddish-testaceous, flagellum more brownish-testaceous beneath, piceous above; tubercles and tegulae reddish-testaceous; pronotal collar, lateral maculations on mesopleura, scutellum entirely, and scutum laterally, dull ferruginous; venter of thorax, metapleura, entire propodeum, and narrow median area of scutum, black; coxae chiefly black, legs otherwise more testaceous, mid and hind femora more or less piceous basally, spurs pale yellow; abdominal terga largely ferruginous, the apical, impunctate margins becoming more yellowish-hyaline, tergum 2 with a pair of widely separated, lateral, yellow maculae; face and vertex very coarsely, deeply and quite closely punctate, punctures becoming very fine and densely crowded on supraclypeal area and clypeus, cheeks rather coarsely rugoso-punctate; scutum, scutellum and pleura coarsely rugoso-punctate, punctures somewhat more distinct on mesopleura below, propodeum rather coarsely rugose posteriorly, becoming somewhat more finely and shallowly so on lateral faces below, triangle dull and densely tessellate below, becoming rather coarsely striate above; discs of abdominal terga very finely

and rather closely punctate basally, becoming impunctate on the broad, apical, impressed margins; basal tergum becoming impunctate laterally and basally, punctures exceedingly minute, barely visible medially; punctures of tergum 5 becoming somewhat more sparse and coarse apically; pseudopygidium transverse, very short, forming the rather narrow, truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short, rather copious on face, cheeks, and on thorax laterally and beneath, entirely white, barely evident on abdomen dorsally except toward apex, more thin and elongate on the sterna; apex of sternum 5 with a pair of tufts of elongate, brownish hairs that converge medially.

DISTRIBUTION—Michigan to Maine, south to North Carolina. May to August.

FLOWER RECORDS—This has been recorded on *Aralia* and *Spiraea*.

Nomada (Nomada) gracilis Cresson

(Fig. 107)

Nomada gracilis Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 295. ♂.

MALE—Length 7.5-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin subcarinate; antennal scape only slightly swollen, apex deeply excavated, more or less completely enclosing pedicel, longer side of basal segment of flagellum about equal to segment 2, median segments considerably longer than broad; mandibles rather slender and simple apically; wings hyaline basally, becoming lightly and narrowly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins and stigma testaceous to ferruginous, basal vein considerably basad of transverse median; tegulae shining, punctures rather close along inner margin, becoming very sparse toward outer margin; posterior margin of scutellum rounded, not at all depressed medially; front coxae not spinose; hind femora slender and unmodified; apical third of clypeus yellow, basal two-thirds black, labrum and mandibles bright yellow, and a pair of small, lateral, yellow maculations continuous with the marginal band of clypeus, ending very narrowly on eye margin slightly below level of antennae; face, vertex and cheeks otherwise black; antennal scape black, somewhat reddened at apex, basal segment of flagellum more reddish-testaceous, flagellum brownish-testaceous below, piceous above; tubercles and tegulae yellowish-testaceous, thorax otherwise black; coxae black, and femora black in large part, becoming rather narrowly testaceous apically, front and middle tibiae somewhat darkened medially, tarsi pale testaceous, the hind tibiae and tarsi more reddish-testaceous, all spurs pale yellow; abdominal terga piceous in large part, tergum 1 entirely so, tergum 2 with a pair of lateral, extensive, yellow maculations which are rather widely separated medially, but occupy most of disc laterally, terga 3 and 4 with very narrow, transverse, yellow bands that are slightly interrupted medially and are adjacent to the broad, depressed apical rims, terga 5 and 6 dull yellow across median, apical area, piceous basally and laterally; abdominal sterna 2-4 with more or less conspicuous, subapical, transverse, yellow bands, sternum 6 yellow over apical half, sterna otherwise piceous; vertex and face above antennae very coarsely and deeply rugoso-punctate, cheeks somewhat more finely so, supraclypeal area and lateral areas of face below antennae quite coarsely and shallowly rugoso-punctate, clypeus with very minute, densely crowded punctures; scutum, scutellum and mesopleura coarsely rugose, scutellum somewhat more finely so, posterior and lateral faces of propodeum coarsely, shallowly rugose, triangle rather smooth but dull below, becoming irregularly rugoso-striate along upper margin; discs of abdominal terga deeply but very finely and closely punctate, minute punctures invading to some degree the depressed apical margins, only the narrow rims impunctate; tergum 1 impunctate laterally and basally, terga 5 and 6 becoming somewhat more coarsely and sparsely punctate toward the depressed apical margins; pubescence entirely pale, rather long, erect and copious on head and thorax, antennal scape quite copiously long pubescent, very short, sparse and obscure on abdominal terga, becoming somewhat more elongate and conspicuous apically, very fine but more elongate and erect on abdominal sterna, sternum 6 rather densely short pubescent apically; median length of pygidial plate somewhat less than basal width, rather strongly narrowed apically, apex more or less deeply emarginate, margins carinate, surface very finely, closely and obscurely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—New York and the New England states. March and April.

FLOWER RECORD—*Salix*.

Nomada (Nomada) illinoensis Robertson

(Fig. 107)

Nomada Illinoensis Robertson, 1900. Canad. Ent. 32, p. 294. ♀ ♂.
Nomada illinoiensis Swenk, 1913. Univ. Nebr. Stud. 12, p. 48. Emend.
Nomada illinoiensis Swenk, 1916. Univ. Nebr. Stud. 15, p. 6. Emend.
Nomada illinoensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Nomada illinoiensis Rodeck, 1951. In Hymenoptera of America North of Mexico, Synoptic Catalog, U. S. D. A. Agr. Monog. 2, p. 1191. Emend.

FEMALE—Length 6-7 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width, posterior margin obscurely subcarinate; longer side of basal segment of flagellum about equal to segment 2, median segments nearly as broad as long; mandibles slender and simple apically; wings lightly infuscated, somewhat more deeply so at apex and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma piceous, basal vein considerably basad of transverse median; tegulae somewhat shining between fine, close punctures which become somewhat more widely separated laterally; posterior margin of scutellum quite deeply impressed; front coxae not spinose; apex of hind tibiae with two or three elongate, very fine, slender bristles; head reddish-testaceous in large part, very small areas of black between bases of antennae, between the ocelli, and along posterior margin of cheeks; antennae testaceous; thorax largely ferruginous, tubercles and tegulae more testaceous, scutum with a narrow, median, black line, and propodeum anteriorly and on median line, black; legs testaceous in general, femora somewhat darkened posteriorly, spurs pale yellow; abdominal terga chiefly pale ferruginous, tergum 2 with a pair of widely separated, rather large, yellow maculae laterally, tergum 3 with similar pair of smaller maculations, tergum 1 piceous basally and more narrowly along apical margin; vertex and face above antennae very coarsely rugosopunctate, becoming much more finely so on supraclypeal area and clypeus, cheeks finely rugose below; scutum, scutellum and mesopleura quite coarsely rugose, propodeum much more finely and shallowly so, the triangle dull, rather smooth below, becoming irregularly striate above; discs of abdominal terga very finely, closely and quite distinctly punctate toward base, apical margins becoming broadly impunctate, tergum 1 impunctate laterally and basally, the more median punctures very obscure; pseudopygidium transverse, very short, forming the rather narrowly truncate, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence very short and thin, entirely pale, somewhat more copious on thorax laterally and beneath, very fine and obscure on abdomen dorsally, but becoming somewhat more distinct apically; sternal plates with a subapical row of very fine slender pale hairs, sternum 5 apically with lateral tufts of rather elongate, fuscous hairs that converge medially.

MALE—Length 5.5-6.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; antennal scape only very slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments nearly as broad as long; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, veins and stigma testaceous, basal vein considerably basad of transverse median; tegulae shining between fine, close punctures; posterior margin of scutellum only very slightly impressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles and lateral facial maculations that extend very narrowly up margin of eye to level of antennae, and a very small yellow spot just posterior to base of mandible on cheeks below, bright yellow; face above margin of clypeus, vertex and cheeks black; antennal scape bright yellow anteriorly, reddish-piceous posteriorly, flagellum testaceous; pronotal tubercles yellow, the tegulae more testaceous, scutellum with a pair of very small, obscure, ferruginous spots, thorax otherwise black; coxae black in large part, legs otherwise chiefly testaceous, hind femora largely piceous, spurs pale yellow; abdominal terga reddish in large part, tergum 1 piceous basally, yellowish medially, becoming ferruginous on apical rim; abdominal terga 2-4 with lateral, yellow maculae that are rather widely separated medially, these more extensive on tergum 2, successively smaller on 3 and 4, discs of 5 and 6 rather broadly yellow medially, apical margins becoming rather broadly yellowish-hyaline; abdominal sterna testaceous in part, with more piceous, irregular infusions; vertex and face above antennae quite coarsely rugose, cheeks much more finely so below, lower half of face more finely and

obscurely punctate, minutely and closely so on supraclypeal area and clypeus, very sparsely so on maculated areas at each side of clypeus; scutum, scutellum and mesopleura very densely rugose, propodeum posteriorly somewhat more shallowly rugose, lateral faces becoming somewhat smoother but very dull and obscurely rugose; discs of abdominal terga very minutely and quite closely punctate toward base, punctures becoming very minute apically, but invading depressed apical margins nearly to rims, tergum 1 becoming impunctate laterally and basally; terga 5 and 6 with somewhat coarser, more distinct punctures apically; pubescence entirely pale, rather short but quite copious over head and thorax, somewhat hiding surface on lower half of face and on venter of thorax, very minute and obscure on abdominal terga, becoming somewhat more elongate apically, abdominal sterna with more elongate, sparse, straight hairs, sternum 6 somewhat more densely pubescent apically; median length of pygidial plate about equal to basal width, quite strongly narrowed apically, apex very narrowly incised, margins carinate, surface very finely, closely and obscurely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to Massachusetts, south to Georgia, March to June.

FLOWER RECORDS—*Crataegus, Rubus* and *Senecio.* Robertson (1929) records *illinoensis* on *Amelanchier, Claytonia, Cornus, Dentaria, Fragaria, Heracleum, Krigia, Polytaenia, Prunus, Radicula, Ribes, Salix, Viburnum* and *Zanthoxylum.*

Nomada indusata new species
(Fig. 107)

MALE—Length 7-9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks subequal to eyes in width, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum nearly equal to segment 2, median segments somewhat longer than broad; mandible slender and simple apically; wings subhyaline basally, becoming lightly infuscated apically, more deeply so at apex and in marginal cell, with the usual three submarginal cells, 3rd somewhat broader anteriorly than 2nd, veins testaceous to piceous, stigma somewhat more brownish, basal vein intersitial with transverse median; tegulae very finely and closely punctate, the more apical punctures slightly separated; posterior margin of scutellum deeply grooved; front coxae not spinose; hind femora slender and unmodified; entire face below level of antennae bright yellow, eyes completely encircled with yellow, but this becoming somewhat tinged with reddish above; median portion of face above antennae and around ocelli, and posterior two-thirds of cheeks, black; posterior margin of vertex somewhat reddish; antennal scape bright yellow anteriorly, narrowly piceous posteriorly, flagellum testaceous beneath, more piceous above; pronotal collar, tubercles, tegulae, scutellum, two small triangular maculations on propodeum, and a transverse yellow stripe on mesopleura, bright yellow, the pleural maculation broadly bordered with red above and with a red spot beneath wing bases; propodeum largely red posteriorly and along posterior margin of lateral faces, scutum dark red, with a median, rather broad, black line; metanotum and lower margin of scutellum, metapleura and anterior portion of propodeum, black, mesopleura below black in part, with some reddish infusions; coxae more or less black at base, becoming yellowish apically, the trochanters more testaceous; hind femora largely piceous, becoming narrowly yellowish at apex, front and middle femora with a very small amount of black at base; all tibiae and tarsi testaceous, spurs pale yellow; abdominal tergum 1 black at base, reddish-piceous at apex, a rather broad median stripe of yellow on each side, somewhat reddened in center; discs of terga 2-6 with broad, transverse, yellow bands that occupy most of each one, slightly interrupted medially on 2, more broadly so on 3, very narrowly on 4, and entire on 5 and 6, broad apical margins of 2 and 3 somewhat piceous or reddish, more red or testaceous on the following terga; discs of the sterna more or less yellowish, apical margins more yellowish-hyaline; face and vertex quite coarsely rugoso-punctate, cheeks much more finely so, punctures of face below somewhat more distinct on each side, minute and obscure on supraclypeal area and clypeus; scutum and propodeum densely and rather finely rugose, punctures of scutellum close and rather coarse but obscure because of the color, mesopleura rather finely rugose or reticulate above, somewhat more coarsely so below; triangle of propodeum smooth on each side below, the median, blackened area finely rugose, becoming short striate on each side above; discs of abdominal terga minutely and very closely punctate, tergum 1 becoming impunctate laterally and basally, apical impressed areas very minutely but rather closely punctate nearly to the rims, apical margins of 4 and 5

somewhat more broadly impunctate; pubescence entirely pale, very short but rather copious on head and thorax, especially beneath, barely evident on abdomen dorsally, very fine and somewhat more elongate on sternal plates, sternum 6 becoming quite densely short pubescent apically; median length of pygidial plate about equal to basal width, strongly narrowed apically, apex narrow and quite deeply emarginate, margins carinate, surface finely and quite closely punctate; exposed abdominal sterna unmodified; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPES—Holotype: Male, Wendell, N. C., Mar. 26, 1925 (Mitchell, on *Amelanchier*) [author's coll.]. Paratypes: NORTH CAROLINA: 1 ♂, Washington, April 4, 1922 (Mitchell); 1 ♂, Raleigh, April 11, 1930 (C. S. Brimley). GEORGIA: 3 ♂♂, Augusta, April 1, 1959 (R. R. Snelling, on *Salix*).

Paratypes are in collections of the North Carolina Department of Agriculture, R. R. Snelling and the author.

Nomada inepta new species

FEMALE—Length 8-11 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin only subcarinate at most; longer side of basal segment of flagellum nearly as long as segment 2, median segments somewhat longer than broad; mandibles slender, elongate and simple; wings subhyaline or pale yellowish basally, becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd much broader than 3rd anteriorly, a hyaline area just beyond the 3rd, veins testaceous to piceous, stigma testaceous, basal vein much basad of transverse median; tegulae shining, punctures deep and distinct, but fine, rather close along inner margin, becoming very sparse over outer half; posterior margin of scutellum only slightly impressed or grooved medially; front coxae with short, triangular, spine-like tubercles; apex of hind tibiae with 4 or 5, rather robust, seta-like bristles; head and thorax largely ferruginous, eyes completely encircled with ferruginous, and ocelli largely surrounded by this color, the broad, median area of face above clypeal margin and around antennae, black, this continuing to the ocelli, and posterior two-thirds of cheeks black; antennae testaceous in general; pronotal collar, tubercles and tegulae somewhat more testaceous, thorax otherwise largely ferruginous, scutum with a rather broad, median black band, and a pair of very narrow sublateral black bands, the mesopleura black beneath, ferruginous above; metapleura and adjacent margin of propodeum entirely black, propodeum posteriorly more ferruginous, with a median black line; coxae largely black, more or less infused with testaceous apically, front and middle trochanters testaceous, all femora more piceous, becoming testaceous apically, the tibiae and tarsi testaceous, and spurs pale yellow; abdominal tergum 1 piceous over basal half and across apical impressed area, ferruginous medially; tergum 2 with a broad, lateral, yellow maculation on each side, these widely separated medially, disc otherwise ferruginous, apical impressed area piceous; tergum 3 similar to 2 but with a very small, yellow maculation on each side, sometimes absent; tergum 4 with a subapical, narrow, transverse band which is slightly interrupted medially and is terminated abruptly toward each side; tergum 5 broadly yellow over median half; vertex and face very coarsely, deeply and closely rugoso-punctate, punctures below antennae coarse, deep and distinct on each side, supraclypeal area rather finely rugose, and clypeus with very fine and densely crowded but distinct punctures; cheeks becoming finely rugoso-punctate below; scutum and scutellum coarsely and very closely rugoso-punctate, the mesopleura rather coarsely reticulate above, becoming more distinctly but quite closely and deeply punctate below; propodeum somewhat more finely and quite densely rugose, lateral faces becoming quite smooth anteriorly, triangle rather smooth and dull below, becoming quite coarsely and irregularly striate along upper margin; abdominal tergum 1 becoming impunctate laterally and basally, median punctures extremely minute and close; discs of terga 2-4 with very fine and close punctures, apical margins becoming smooth and impunctate apically, invaded only slightly with very minute, scattered punctures, tergum 5 closely punctate across base, punctures becoming rather coarse and well separated toward apical margin; pseudopygidium transverse, very narrow, forming the rather broad, apical margin of tergum 5, very slightly outcurved, covered with dense, suberect, silvery tomentum; head with very fine, thin, subappressed pubescence and with erect, elongate, dark hairs, conspicuously evident in front and on head below; thoracic pubescence very short, largely inconspicuous and pale, but scutellum with elongate, erect, dark hairs in evidence; pubescence hardly evident on abdomen dorsally, becoming somewhat more elongate and conspicuous apically, sternal plates with fine, elongate, suberect, pale hairs;

apex of sternum 5 with a marginal fringe of elongate, brownish hairs that curve and tend to converge toward mid-line.

TYPES — Holotype: Female, Reading, Mass., April 7, 1929 (Richard Dow) [M.C.Z.]. Paratypes: MASSACHUSETTS: 1 ♀, topotypical; 1 ♀, Forest Hills, April 6 (or June 4), 1912; 2 ♀♀, Wollaston, June 1, 1895 (F. H. Sprague); 1 ♀, Salem, April 19, 1914 (S. E. Cassino). NORTH CAROLINA: 1 ♀, Grandfather Mt., Watauga Co., June 20, 1950. (Mitchell). MAINE: 1 ♀, Mt. Desert, April 21, 1933 (on *Salix*); 1 ♀, Orono, May 6, 1926. NEW HAMPSHIRE: 1 ♀, Jaffrey, June 19. NEW YORK: 1 ♀, Ithaca, May 13, 1934 (H. Dietrich). MINNESOTA: 1 ♀, Itasca Park, LaSalle Valley, May 30, 1935 (C. E. Mickel).

Paratypes are in collections of the Museum of Comparative Zoology, the University of Maine, the University of Minnesota, and the author.

Nomada kingstonensis new species

FEMALE—Length 6.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other, and nearer each other than to eyes; cheeks nearly as broad as eyes, hind margin conspicuously carinate; longer side of basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings hyaline, faintly clouded apically, veins and stigma testaceous, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd which is narrowed nearly to a point, basal vein interstitial with transverse median; tegulae yellowish-hyaline, smooth and shining, minutely and quite sparsely punctate; scutellum with a very faint, median impression; front coxae not spinose; apex of hind tibiae with 4 or 5 elongate, seta-like bristles; clypeus, labrum, mandibles and lower portion of face adjacent to eyes, pale yellow, a narrow band of yellow completely surrounding eyes; median portion of face around antennae and ocelli, and cheeks in large part, blackish, the area below antennae partially infused with yellow; antennal scape yellowish anteriorly, flagellum more testaceous beneath, brownish above; scutum black in large part, narrowly margined with yellow on each side, scutellum, pronotal collar and tubercles yellow, mesopleura with a small yellow spot beneath wing bases and a larger, transverse, yellowish area beneath, the narrow intermediate area darkened, venter largely black; propodeum largely yellowish; legs largely yellow, becoming somewhat more testaceous basally, spurs pale yellow; discs of abdominal terga 1-4 piceous, but apical margins very broadly yellowish-hyaline, these areas forming about half of each disc, tergum 5 in large part pale yellowish; head and thorax rather coarsely rugoso-punctate, somewhat more finely so below antennae and on cheeks; basal areas of abdominal terga very finely but deeply, distinctly and closely punctate, apical impressed areas entirely impunctate; pseudopygidium very narrow, transverse, of the usual form; pubescence short and thin, entirely pale, hardly evident on abdomen basally, becoming rather copious although still short and thin, apically.

TYPE — Holotype: Female, Kingston, R. I., April 26, 1904 [Univ. of Rhode Island].

Nomada (Nomada) lehighensis Cockerell

Nomada lehighensis Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 605. ♀. (♂ misidentified)

FEMALE—Length 6.5-8 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks slightly narrower than eyes, posterior margin not distinctly carinate; longer side of basal segment of flagellum about equal to segment 2, median segments very slightly longer than broad; mandibles quite slender and simple; wings hyaline basally, becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd and 3rd subequal anteriorly, a distinct hyaline area beyond the 3rd, veins testaceous to piceous, stigma pale testaceous, basal vein slightly basad of transverse median; tegulae shining between fine but rather close and distinct punctures, these becoming somewhat more sparse toward outer margin; posterior margin of scutellum somewhat rounded, not at all impressed medially; front coxae not spinose; apex of hind tibiae with a row of three or four robust, fuscous, seta-like bristles, and a slender, more elongate, hair-like bristle; head and thorax chiefly ferruginous, face with a small black area above each antenna and another surrounding ocelli, and posterior margin of cheeks rather narrowly black; lower half of face somewhat more testaceous, antennae entirely testaceous; tubercles, tegulae and pronotal collar somewhat more testaceous; scutum and propodeum ferruginous, each with a median black line, the metapleura black, and a limited amount of black beneath

just posterior to front coxae; legs largely testaceous, spurs pale yellow, hind basitarsi somewhat darkened anteriorly; abdomen entirely ferruginous or testaceous, without yellow maculations; vertex and face above antennae coarsely, deeply rugoso-punctate, lower half of face with more distinctly separated but quite coarse punctures laterally, supraclypeal area and clypeus very finely and closely punctate, and cheeks with shallow but rather coarse punctures below; scutum coarsely rugoso-punctate medially, becoming somewhat more finely and densely so laterally; scutellum somewhat more finely rugoso-punctate throughout, mesopleura quite coarsely reticulate above, becoming more distinctly but still closely punctate below; propodeum very finely and rather shallowly rugoso-punctate, becoming somewhat smoother below on each lateral face, triangle smooth below, median black area becoming finely rugoso-striate over upper half, the lateral ferruginous areas narrowly short striate along upper margin; abdominal tergum 1 practically impunctate, discs of 2-5 minutely and closely punctate basally, impressed apical margins broadly yellowish-hyaline and impunctate, punctures of tergum 5 becoming somewhat more sparse and distinct apically; pseudopygidium very short, transverse, forming the rather narrow, truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence entirely pale, short but rather copious and erect on head and thorax, more dense on thorax beneath and along lateral margins of propodeum, hardly evident on abdomen dorsally, becoming somewhat more elongate and conspicuous on tergum 5 apically; sternal plates with more elongate but very sparse, fine, pale hairs; apex of sternum 5 with a row of elongate hairs on each side of mid-line which are brownish, more or less curved, and convergent toward mid-line.

DISTRIBUTION — Michigan to Nova Scotia, south to Georgia, March to July.

FLOWER RECORD—*Crataegus*.

Nomada media new species
(Fig. 107)

FEMALE—Length 9 mm.; lateral ocelli very slightly nearer margin of vertex than to each other, somewhat more distant from eyes; cheeks nearly as broad as eyes, posterior margin strongly carinate; longer side of basal segment of flagellum slightly shorter than segment 2, median segments somewhat longer than broad; mandibles slender and simple; wings subhyaline at base, narrowly and rather lightly infuscated apically, but with a pronounced hyaline area just beyond 3rd submarginal cell, 2nd very broad anteriorly, 3rd narrowed nearly to a point, veins and stigma testaceous to piceous, basal vein slightly basad of transverse median; tegulae shining, punctures deep and distinct, rather sparse except along inner margin; scutellum quite deeply grooved medially; front coxae not spined; apex of hind tibiae with a row of 5 or 6 rather short, spine-like setae; head largely red, clypeus narrowly yellowish along apical margin, labrum yellowish and supraclypeal area with a small yellowish spot; area between and just above antennae, extending downward on each side along margin of clypeus, posterior half of cheeks, and space between ocelli, black; scape and basal segment of flagellum ferruginous, the more apical antennal segments reddish-testaceous beneath, somewhat more brownish above; thorax red in large part but scutum with a median black line, pronotum narrowly yellow, becoming black laterally; tubercles and an anterior spot on pleura yellow, and propodeum rather narrowly yellow on each side of a median blackened area; metapleura and adjacent lateral faces of propodeum black; legs in large part reddish-testaceous, femora more or less blackened toward base, spurs pale yellow; basal abdominal tergum ferruginous over apical half, basal half blackish, tergum 2 with a pair of large, widely separated, yellow maculations, terga 3 and 4 with very small, lateral yellow spots, and 5 with a transverse yellow line just anterior to the pseudopygidium; abdominal sterna largely ferruginous, the impressed apical margins darker; pseudopygidium very broad and extensive (as in *depressa*), its width considerably more than one-third the total width of the plate, covered with fine silvery tomentum; punctures quite coarse, close and deep in general over head and thorax but becoming rather fine and shallow on lower part of face, those on scutum and scutellum distinct and coarse but not crowded; punctures finer and rather densely crowded on propodeum, the triangle more tessellate below, becoming quite coarsely striate along upper margin; abdominal terga very minutely punctate, punctures barely evident on tergum 1, well separated but distinct on 2, somewhat closer on the successive, more apical terga, apical margins rather narrowly shining and impunctate; pubescence very short and thin, somewhat yellowish on upper portions of head and thorax, more whitish laterally and beneath, barely evident on abdominal terga, but apical segments with more conspicuous, elongate, fuscous hairs.

MALE—Length 7-9 mm.; lateral ocelli slightly nearer margin of vertex than to each

other; cheeks slightly narrower than eyes, posterior margin strongly carinate; antennal scape slightly swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, the shorter side not much longer than apical breadth, median segments somewhat longer than broad; mandibles slender and simple; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd only very slightly broader anteriorly than 3rd, veins and stigma testaceous, basal vein interstitial with transverse median; tegulae shining, punctures very minute, obscure and sparse; posterior margin of scutellum deeply grooved; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, and very narrow lateral facial maculations, bright yellow; face, vertex and cheeks otherwise black; antennae, including scape, largely testaceous, flagellum piceous above; tubercles testaceous, tegulae yellowish-testaceous; scutellum ferruginous, the scutum ferruginous and black, in more or less alternating stripes, mesopleura with a dull reddish, lateral maculation, otherwise pleura and propodeum black; coxae black in large part, the trochanters testaceous; front and middle femora piceous at base, becoming testaceous apically, hind femora largely piceous and only very narrowly testaceous at apex; front and mid tibiae and tarsi pale testaceous, the hind tibiae more ferruginous, tarsi somewhat darkened, and all spurs pale yellow; abdominal tergum 1 piceous over basal half, dull testaceous medially and somewhat darkened apically; tergum 2 with a pair of conspicuous, lateral, yellow maculations that are rather widely separated medially, surface otherwise piceous basally and apically, more or less ferruginous medially; tergum 3 with a similar but very much smaller pair of maculae, the disc more testaceous, apical margins somewhat darkened; disc of tergum 4 more piceous, apical impressed area becoming yellowish-hyaline; tergum 5 largely testaceous; the more basal abdominal sterna piceous, the more apical plates testaceous; face and vertex coarsely and deeply rugoso-punctate, cheeks becoming more finely reticulate below, supraclypeal area with fine, crowded punctures, and clypeus with minute, close punctures, the lateral maculae largely impunctate; scutum, scutellum and mesopleura coarsely rugose or reticulate, propodeum posteriorly somewhat more shallowly but rather coarsely rugose, becoming somewhat smoother below on each side, triangle very finely reticulate medially, only very narrowly smooth on each side below, with coarse, elongate striations across upper margin; discs of abdominal terga minutely and rather closely punctate, tergum 1 becoming impunctate laterally and basally, apical impressed areas on the following terga invaded to a considerable degree by exceedingly minute, rather widely scattered punctures; pubescence entirely pale, quite short but erect and clearly evident on head and thorax, extremely fine and obscure on abdomen dorsally, becoming more evident apically, sternal plates with very fine but more elongate, whitish hairs, sternum 6 becoming quite densely short pubescent at apex; median length of pygidial plate somewhat greater than basal width, rather strongly narrowed apically, apex rather deeply emarginate, margins carinate, surface quite closely and rather finely punctate; exposed sternal plates unmodified, sternum 6 narrowed apically to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPES—Holotype: Female, Highlands, N. C., June 7, 1957. Allotype: Male, topotypical (both Mitchell) [author's coll.]. Paratypes: NORTH CAROLINA: 2 ♀♀, topotypical, June 5, 1957 (on *Azalea*); 1 ♀, Whiteside Mt., June 6, 1957 (on *Rubus*); 1 ♀, Blowing Rock, Aug. 10, 1920; 1 ♂, Blue Ridge Pkwy., Ashe Co., June 28, 1948; 1 ♂, Blue Ridge Pkwy., Wilkes Co., June 2, 1950 (on *Vaccinium*); 1 ♂, Linville, July 27, 1923 (all Mitchell); 1 ♂, Mt. Pisgah, 4-5,000 ft., July 8, 1959; 1 ♂, Haywood Co., July, 1959 (both H. V. Weems, Jr.); 1 ♀, Great Smoky Nat. Pk., June 25, 1940 (C. T. Brues); 1 ♀, Spence Field, GSMNP, Aug. 13, 1947 (Bullock-Dreisbach). TENNESSEE: 1 ♀, New Found Gap, GSMNP, Aug. 14, 1947 (Bullock-Dreisbach); 1 ♀, 2 ♂♂, Gatlinburg, GSMNP, June 13 & 29, 1947 (R. H. Whittaker).

Paratypes are in collections of the North Carolina Department of Agriculture, the Florida Plant Board, the Museum of Comparative Zoology, the U. S. National Museum, R. R. Dreisbach, and the author.

Nomada mendica new species
(Fig. 107)

MALE—Length 7-8.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin indistinctly carinate if at all; antennal scape rather strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum considerably shorter

than segment 2, median segments considerably longer than broad; mandibles slender and elongate, entirely simple; wings largely hyaline, very faintly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd slightly narrower than 3rd anteriorly, veins pale testaceous, stigma more brownish-testaceous, basal vein interstitial with, or slightly basad of, transverse median; tegulae somewhat shining, punctures minute, indistinct and quite sparse; posterior margin of scutellum slightly impressed medially; front coxae not spinose; hind femora quite slender and unmodified; clypeus, labrum, mandibles, and narrow, lateral facial maculae ending narrowly on eye margin at level of antennae, bright yellow; remainder of face, vertex and cheeks black, the black very slightly invading upper margin of clypeus; antennal scape yellow anteriorly, piceous posteriorly, basal segment of flagellum somewhat yellowish, the more apical segments testaceous beneath, piceous above; tubercles and tegulae yellowish-testaceous, and mesopleura with a very small anterior yellowish spot that is partially surrounded with ferruginous; scutellum largely ferruginous; thorax otherwise black; coxae black, the trochanters testaceous at least in part, front and mid femora narrowly piceous at base, hind femora more extensively piceous, all becoming testaceous apically, the tibiae and tarsi entirely testaceous, spurs pale yellow; tergum 1 of abdomen piceous across basal half, apical half more testaceous, somewhat yellowish medially; terga 2-5 narrowly yellowish-hyaline apically, with broad, yellowish-testaceous, lateral maculae, slightly interrupted medially on 2 and 3, less extensive on 4 and 5, tergum 6 more or less yellowish before the apical margin; abdominal sterna 2 and 3 testaceous medially, the more apical sterna piceous, sternum 6 pale yellow; vertex and face above antennae coarsely, closely and deeply punctate, punctures becoming fine, shallow and subcontiguous on cheeks below, rather closely and quite coarsely punctate between supraclypeal area and eyes, supraclypeal area very finely rugose, the clypeal punctures very minute and rather sparse; scutellum coarsely reticulate, pleura quite coarsely reticulate above, punctures becoming more distinct and separated below; propodeum posteriorly and laterally rather finely reticulate, becoming somewhat smoother below on each side, triangle smooth but rather dull below, becoming rather widely rugoso-striate above medially, very coarsely, short striate on each extreme side; punctures of abdominal terga exceedingly minute and close throughout, only the rather narrow, apical rims entirely impunctate, tergum 1 becoming impunctate laterally and basally; discs of terga 5 and 6 somewhat more deeply and coarsely punctate apically; pubescence largely pale, whitish below, more yellowish on head and thorax above, short but rather copious on face, cheeks below, and on thorax laterally and below, barely evident on abdomen dorsally, becoming somewhat more elongate and conspicuous on the more apical terga, very fine and sparse but more elongate on the sterna, sternum 6 becoming rather densely short pubescent toward apex; median length of pygidial plate very slightly longer than basal width, only slightly narrowed apically, apex rather broadly truncate, slightly incurved but hardly emarginate, margins carinate, surface rather finely and closely punctate; exposed abdominal sterna unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPES—Holotype: Male, Hartland, Vt., May 21, 1913 (P. W. Whiting) [M.C.Z.]. Paratypes: VERMONT: 1 ♂, topotypical; 1 ♂, Putney, May 24, 1913 (both Whiting). NEW HAMPSHIRE: 1 ♂, carriage road, Mt. Washington, July 1.

Paratypes are in the Museum of Comparative Zoology and in the author's collection.

Nomada minima new species

MALE—Length 4.5-5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin not carinate; antennal scape slender, apex deeply excavated, with only apex of pedicel exposed, basal segment of flagellum much shorter than segment 2, median segments slightly longer than broad; mandibles rather short, entirely simple; wings hyaline basally becoming very lightly infuscated at apex, violacious, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins and stigma pale testaceous, basal vein much basad of transverse median; tegulae shining, punctures exceedingly minute and vague; posterior margin of scutellum rounded, not at all grooved; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles and narrow lateral maculae bright yellow, face, vertex and cheeks otherwise black, the facial maculae ending narrowly on eye margin at level of antennae; antennal scape yellowish anteriorly, more piceous posteriorly, flagellum entirely testaceous; tubercles and tegulae yellowish, pronotal collar, scutum and scu-

tellum testaceous or ferruginous, scutum with a rather broad, median, longitudinal, black band, thorax otherwise black; legs entirely pale testaceous to yellowish, spurs pale yellow; discs of abdominal terga testaceous, with yellow maculations, tergum 1 broadly piceous at base, 2 and 3 with extensive, lateral maculations which nearly meet medially and are very broad laterally, terga 1, 4 and 5 with or without smaller, lateral maculations, that on 5 more median; abdominal sterna testaceous in large part; face and vertex quite coarsely and deeply rugoso-punctate, cheeks much more finely so, lower part of face coarsely rugose on each side, but maculated areas much more finely and sparsely punctate, clypeus with very minute, obscure and close punctures; scutum, scutellum and mesopleura quite coarsely and densely rugose, propodeum posteriorly somewhat more shining and vaguely subrugose, more coarsely so on each side, but lateral faces becoming smooth below, triangle smooth below, becoming irregularly striate across upper margin; discs of abdominal terga minutely and closely punctate, tergum 1 becoming impunctate laterally and basally, depressed apical margins invaded by scattered, exceedingly minute punctures, only the narrow rims impunctate; pubescence entirely white, rather short but copious on head and thorax, nearly hiding surface on thorax beneath, barely evident on abdomen dorsally, but becoming somewhat more conspicuous apically, sternal plates with very sparse pale hairs, sternum 6 becoming rather densely pubescent toward apex; median length of pygidial plate about equal to basal width, strongly narrowed apically, apex deeply but narrowly emarginate, margins carinate, surface very finely and rather closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature similar to those of *sayi* (fig. 107).

TYPES—Holotype: Male, Great Falls, Va., April 30 (N. Banks) [M.C.Z.]. Paratype: 1 ♂, Great Falls, Md., April 27 (Banks) [author's coll.], 1 ♂, Raleigh, N. C., April 23, 1961 (Mitchell).

Nomada (Nomada) nigrocincta Smith

Nomada nigrocincta Smith, 1879. Descr. New Species Hym. Brit. Mus., p. 99. ♀.
Nomada nigrocincta var. *d* Lovell and Cockerell, 1905. Psyche 12, p. 41. ♀.
Nomada nigrocincta Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 311.

No specimens of *nigrocincta* have been found in any of the collections studied. The single specimen from Maine described by Lovell and Cockerell as var. d may or may not represent that species. It has not been seen, as it was not in the collection of Lovell types received from Harvey B. Lovell. The following descriptive note was made from the type in the British museum:

FEMALE—Length 9 mm.; mandibles slender, simple; 2nd segment of flagellum equal to longer side of basal segment; antennae entirely ferruginous; face black between antenna, extending up around ocelli and cheeks posteriorly, face otherwise red, but a black line extending along upper margin of clypeus and around supraclypeal area; scutum dark red, with a narrow median black line, contiguously and rather deeply punctate; scutellum red, not at all bilobed (evenly rounded), closely and finely punctate; mesopleura red, rather coarsely rugoso-punctate, the sternum black; metapleura and propodeum black, posterior surface of propodeum somewhat reddened on each side; tubercles shining, finely and sparsely punctate; wings subhyaline, narrowly infuscated along outer margin, basal vein slightly basad of transverse median; front coxae simple; legs mostly red, but base of all femora blackened; abdominal terga largely red or ferruginous, basal tergum black over basal half and along apical margin, and apical margin of second and third blackened, punctures very close, fine and shallow, hardly visible; pseudopygidium of the usual form.

DISTRIBUTION — "Arctic America," possibly Maine.

Nomada orba new species
(Fig. 107)

MALE—Length 6 mm.; lateral ocelli somewhat nearer margin of vertex than to each other, and considerably nearer each other than to eyes; cheeks subequal to eyes in width, posterior margin not distinctly carinate; antennal scape rather strongly swollen, apex deeply excavated, largely enclosing pedicel, longer side of basal segment of flagellum somewhat shorter than segment 2, median segments slightly longer than broad; mandible slender and simple; wings hyaline, becoming faintly clouded along apex, veins testaceous, stigma somewhat brownish, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, basal vein interstitial with transverse median; tegulae yellowish-hyaline, smooth and shining, very finely and sparsely punctate; scutellum narrow, rounded, not at all impressed; front coxae not spinose; hind femora not modified; clypeus, labrum, mandibles except tips, and small lateral macu-

lations adjacent to mandibles, yellow; head otherwise black; antennal scape yellow anteriorly, otherwise dark, flagella testaceous beneath, piceous above; tubercles yellowish, thorax otherwise black; tibiae and tarsi yellowish-testaceous, spurs pale yellow, femora becoming yellowish at apex but otherwise more piceous, front femora more or less yellowish anteriorly; basal abdominal tergum blackish over basal half, more or less reddish otherwise, but with dark infusions; discs of terga 2 and 3 very broadly yellowish laterally, these nearly meeting medially, but definitely separated, apical impressed areas more testaceous-hyaline; terga 4 and 5 with somewhat smaller, lateral, yellow maculations that are slightly interrupted, 6 with a median, subapical, yellow blotch; head and thorax coarsely rugoso-punctate, clypeus very finely and closely punctate beneath rather dense pubescence, the maculated areas with only sparse, fine punctures; abdominal terga very minutely punctate, punctures barely evident on tergum 1, somewhat more distinct and very close on the others; pubescence entirely pale, short but rather copious on lower portions of face and cheeks, and on thorax laterally, posteriorly and beneath, very fine and barely evident on abdomen basally, becoming more conspicuous and more elongate apically; pygidial plate narrow and elongate, somewhat narrowed apically, apex subtruncate, without a distinct emargination, margins carinate, surface finely and closely punctate; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPE—Holotype: Male, Ithaca, N. Y., April 22 (year?) [Cornell].

Nomada (Nomada) parva Robertson
(Fig. 107)

Nomada parva Robertson, 1900. Canad. Ent. 32, p. 294. ♀ ♂.

Nomada infantula Cockerell, 1907. Entomologist 40, p. 98. ♀ ♂. New synonymy

Nomada parva Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 5-5.5 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks much narrower than eyes, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments only very slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming rather deeply infuscated along apical margin and in marginal cell, with the usual three submarginal cells, 2nd very much broader anteriorly than 3rd, veins pale testaceous, stigma somewhat more ferruginous, basal vein somewhat basad of transverse median; tegulae shining between very fine and indistinct punctures, these close along inner margin, becoming quite sparse along outer margin; posterior margin of scutellum slightly impressed medially; front coxae not spinose; apex of hind tibiae with a row of four or five very slender but elongate hair-like bristles; head largely yellowish-ferruginous, quite strongly yellow along margins of eyes below, a small amount of black between and above antennae and around ocelli, and cheeks rather narrowly black along posterior margin; antennal scape yellowish anteriorly, somewhat more reddish-piceous posteriorly, flagellum brownish-testaceous below, more brownish-piceous above; tubercles and tegulae strongly yellow, thorax otherwise largely yellowish-ferruginous, pronotal collar somewhat more yellowish, scutum with a median black line, and mesopleura with a restricted black area below; abdominal terga largely testaceous, becoming broadly yellowish-hyaline apically, terga 2 and 3 with small, widely separated, yellow maculae; vertex and face above antennae coarsely, closely and deeply punctate, cheeks much more finely so, supraclypeal area and clypeus very finely and closely punctate, the lateral areas of face below antennae quite coarsely and distinctly punctate; scutum, scutellum and mesopleura quite densely rugose, propodeum somewhat more finely so posteriorly, lateral faces becoming somewhat smoother below, triangle rather smooth but dull below, becoming obscurely rugoso-striate above; legs testaceous in large part, front legs more yellowish anteriorly, spurs pale yellow; abdominal terga practically impunctate, the more apical terga with scattered, shallow and fine punctures evident apically; pseudopygidium very short, transverse forming the very narrow, truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence very short and thin, entirely whitish, rather dense on thorax laterally and below and on cheeks below, hardly evident on abdomen dorsally, sterna with very fine and sparse, whitish hairs; apex of sternum 5 with a tuft of rather elongate, yellowish hairs on each side of midline, which converge medially.

MALE—Length 4.5-6 mm.; lateral ocelli somewhat nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin only obscurely subcarinate; antennal scape slightly swollen, apex deeply excavated, largely enclosing pedicel, basal segment of flagellum very short, the

longer side somewhat shorter than segment 2 which is also short, median segments little if any longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated along apical margin and marginal cell, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins testaceous to piceous, basal vein slightly basad of, or interstitial with, transverse median; tegulae shining between minute, rather sparse, barely visible punctures; scutellum rounded posteriorly, not appreciably impressed; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, and lateral facial maculae that extend very narrowly up margin of eye to level of antennae, bright yellow; face above clypeus largely black, vertex and cheeks entirely so; antennal scape yellow anteriorly, piceous posteriorly, flagellum pale testaceous below, somewhat more brownish above; tubercles and a very small anterior spot on mesopleura, yellow, tegulae more testaceous-hyaline, thorax otherwise black; legs entirely yellowish-testaceous, spurs pale yellow, hind tarsi somewhat darkened; abdominal terga reddish-testaceous in part, basal tergum blackish across base, terga 2-6 with lateral, widely separated, bright yellow maculae, those on 2 rather large, successively smaller on the succeeding terga, median basal areas of discs testaceous to piceous, the broad, apical, impressed rims yellowish-hyaline; sterna yellowish at least in part, apical rims broadly hyaline, sternum 6 bright yellow in large part; vertex, face above antennae and upper part of cheeks densely and rather coarsely rugose, cheeks below and lower half of face more finely rugose; clypeus and supraclypeal area very minutely and closely punctate beneath rather dense pubescence; scutum, scutellum and mesopleura densely rugose, pleura somewhat more coarsely so; propodeum posteriorly rather coarsely rugose, becoming rather smooth on each lateral face below, triangle somewhat smoother below, becoming quite coarsely and irregularly reticulate above; discs of abdominal terga very minutely and rather closely punctate basally, punctures invading the depressed apical rims but becoming extremely minute and obscure, especially on the more apical terga; pubescence rather short, entirely whitish, quite dense over face, lower cheeks and thorax below and posteriorly, very fine and inconspicuous on abdomen dorsally, more elongate but very sparse on abdominal sterna, sternum 6 becoming rather densely but very finely pubescent along mid-line toward apex; pygidial plate rather narrow, median length somewhat greater than basal width, the narrow apex rather deeply incised, margins carinate, surface very finely and closely punctate; exposed abdominal sterna unmodified, sternum 6 strongly narrowed to the narrowly rounded tip; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Michigan to the New England states, south to Mississippi, March to June.

FLOWER RECORDS—*Fragaria, Rubus* and *Senecio*. This species is recorded by Robertson (1929) on *Capsella, Geum, Nothoscordum, Osmorrhiza, Potentilla, Ranunculus* and *Smilax*.

Nomada (Nomada) pygmaea Cresson
(Fig. 107)

Nomada pygmaea Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 299. ♂.

Nomada (Nomada) bilobata Swenk, 1913. Nebr. Univ., Studies 12, p. 25. ♂. New synonymy

FEMALE—Length 7-8 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks nearly equal to eyes in width, posterior margin quite distinctly carinate; longer side of basal segment of flagellum slightly shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple apically; wings subhyaline basally, sometimes distinctly yellowish, becoming rather deeply infuscated along outer margin and in marginal cell anteriorly, with the usual three submarginal cells, 2nd slightly broader than 3rd anteriorly, veins testaceous to piceous, basal vein considerably basad of transverse median; tegulae somewhat shining, punctures quite deep and distinct, rather close along inner margin, becoming sparse along outer margin; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; apex of hind tibiae with two or three elongate, seta-like bristles; head largely ferruginous, somewhat more yellowish below, eyes completely encircled with ferruginous, a restricted area between and above antennae, another between ocelli, and posterior half or more of cheeks, black; antennal scape more testaceous, flagellum brownish-testaceous below, more piceous above; thorax largely dark red, tubercles and tegulae more yellowish-testaceous, metapleura and narrow adjoining margin of propodeum black, scutum and posterior face of propodeum with a median black line, mesopleura with some black beneath anteriorly; legs largely testaceous, femora more or less piceous except at apex, spurs pale yellow, hind basitarsi darkened; abdominal terga red-

dish in large part, tergum 1 piceous across base, 2 and 3 with lateral, widely separated, yellow maculations; abdominal sterna largely reddish, impressed apical margins of 1 and 2 more piceous, on 3 and 4 more yellowish; vertex, face above antennae, and cheeks above, very coarsely, deeply and closely punctate, cheeks below becoming more finely rugose; supraclypeal area and clypeus very finely rugoso-punctate, the punctures becoming more indefinite on clypeus apically, face laterally rather finely, closely and obscurely punctate; scutum, scutellum and mesopleura very coarsely and closely punctate, punctures becoming somewhat finer on pleura below; propodeum more finely and densely rugoso-punctate posteriorly, lateral faces becoming somewhat smoother, triangle dull and tessellate below, becoming rather broadly striate along upper margin; discs of abdominal terga with very fine, close punctures toward base, the broad apical impressed areas entirely impunctate, tergum 1 impunctate laterally and basally, tergum 5 becoming somewhat more distinctly but rather sparsely punctate apically; pseudopygidium transverse, extremely short, forming the truncate apical margin of tergum 5, densely clothed with suberect, silvery tomentum; pubescence extremely short and inconspicuous, white where visible, somewhat more dense on lower part of face, cheeks and on thorax posteriorly and below, quite dense on posterior face of propodeum, barely evident on abdomen dorsally, becoming somewhat more evident apically, apex of sternum 5 with a very small tuft of elongate, brownish hairs that converge medially.

MALE—Length 6-8.5 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks considerably narrower than eyes, posterior margin subcarinate; antennal scape strongly swollen, apex deeply excavated and completely enclosing pedicel, longer side of basal segment of flagellum much shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple apically; wings subhyaline basally, becoming faintly infuscated apically and in marginal cell, with the usual three submarginal cells, 2nd usually much broader than 3rd anteriorly, veins largely testaceous, basal vein much basad of transverse median; tegulae shining, punctures minute, rather close along inner margin, becoming very sparse toward outer margin; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; hind femora slender and unmodified; clypeus, supraclypeal area, labrum, mandibles and narrow lateral maculae, bright yellow, lateral maculae continuing over top of eye, somewhat more ferruginous above; vertex and median area of face above antennae black, with some black between supraclypeal mark and lateral maculations, cheeks largely black, with a narrow yellow band along eye margin below; antennal scape bright yellow anteriorly, becoming more or less piceous posteriorly, flagellum testaceous; pronotal collar, tubercles and tegulae more or less yellowish; scutum, scutellum and large median area of mesopleura more ferruginous, scutum with a median black line, mesopleura black below, metapleura and entire propodeum black; discs of abdominal terga 2 and 3 more testaceous, with broad, lateral, yellow maculations which are widely separated medially, impressed apical margins becoming somewhat more yellowish; tergum 1 piceous or black basally, more or less testaceous medially as a broad band, becoming somewhat darkened toward the rim; terga 4-6 more or less testaceous basally, becoming somewhat darkened toward the broadly impressed, yellowish-hyaline, apical margins; discs of abdominal sterna 2-4 testaceous, the broad, apical rims more yellowish-hyaline, sterna 1, 5 and 6 more piceous; vertex medially and face above antennae coarsely and deeply rugoso-punctate, becoming somewhat more finely so on cheeks and on vertex laterally; supraclypeal area and lateral areas of face closely and rather coarsely punctate, clypeus very finely and closely so; scutum, scutellum and mesopleura very coarsely rugoso-punctate, propodeum somewhat more finely rugose posteriorly and laterally, triangle somewhat smoother below but dull, becoming rather coarsely rugoso-striate along upper margin; discs of abdominal terga minutely and rather closely punctate basally, the punctures invading to some degree the impressed apical margins, but very minute and obscure; tergum 1 impunctate laterally and basally, and the more apical terga with somewhat coarser and more sparse punctures apically; pubescence entirely white, rather copious on face, on cheeks below, on thorax laterally and beneath, very fine and obscure on abdominal terga, becoming somewhat more conspicuous apically, sterna with very fine and sparse suberect hairs, sternum 6 becoming quite densely pubescent apically; median length of pygidial plate about equal to basal width, apex more or less deeply emarginate, margins carinate, surface quite closely and finely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed apically to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to Maine, south to Virginia, April to July.

FLOWER RECORDS—*Evonymus, Rhus* and *Rubus*.

Nomada salicis Robertson

Nomada salicis Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 52. ♂.
Nomada salicis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

No specimens of *salicis* have been collected, nor have any been found in other collections received for study. The following descriptive note was made from the type in the Illinois Natural History Survey:

MALE—Face black, with entire clypeus, labrum and mandibles yellow, with yellow lateral face marks ending abruptly on eye margin about at level of antennae; scape and basal segment of flagellum yellow, flagellum otherwise brownish-ferruginous beneath, piceous above, median segments broader than long, basal segment shorter than segment 2; mandibles simple; thorax black, finely and densely rugoso-punctate; tubercles, a pair of spots on scutellum, and a narrow band on pleura below, yellow; coxae and legs largely yellow, the femora more or less piceous; wings hyaline, lightly infuscated apically, basal vein basad of transverse median; front coxae not spined; abdominal terga shining, nearly impunctate, terga 1-6 with entire, transverse, yellow bands, that on 2 narrowed medially; pygidial plate notched at apex.

DISTRIBUTION—Illinois.

FLOWER RECORD—Recorded by Robertson (1929) on *Salix amygdaloides*.

Nomada (Nomada) sayi Robertson

(Fig. 107)

Nomada sayi Robertson, 1893. Amer. Ent. Soc. Trans. 20, p. 276. ♀ ♂.
Nomada sayi Robertson, 1900. Canad. Ent. 32, pp. 293-294. ♀ ♂. (redescribed)
Nomada sayi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 5.5-8 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin not carinate; longer side of basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; mandibles simple; wings hyaline basally, becoming lightly infuscated along apical margin and marginal cell, with the usual three submarginal cells, 2nd usually somewhat broader than 3rd anteriorly, veins testaceous to piceous, basal vein much basad of transverse median; tegulae shining between exceedingly minute and inconspicuous punctures, these rather close along inner margin, very sparse toward outer margin; posterior margin of scutellum deeply depressed medially; front coxae not spinose; apex of hind tibiae with 2 or 3 elongate, hair-like, yellowish bristles; head testaceous in large part, with a limited area of black between antennae, between the ocelli, and over posterior half of cheeks; antennae testaceous; thorax somewhat more reddish, tubercles and tegulae yellowish-testaceous, scutum with a median black line, metapleura black, mesopleura with blackened areas below; legs largely testaceous, femora more or less darkened basally, hind tibiae and tarsi somewhat darkened, all spurs pale yellow; abdominal terga reddish-testaceous, 2 and 3 with lateral, widely separated, yellow maculations, the broad, impressed, apical margins becoming more or less yellowish-hyaline; abdominal sterna largely testaceous; vertex, cheeks above, upper part of face and lateral areas below antennae very coarsely, deeply and closely punctate, cheeks much more finely punctate below, the supraclypeal area and clypeus very finely and closely so; scutum, scutellum and mesopeura very densely rugose, punctures becoming somewhat more distinct on mesopleura below, posterior face of propodeum more finely or shallowly rugose, lateral faces becoming somewhat smoother below, triangle smooth and somewhat shining below, becoming irregularly and rather coarsely striate along upper margin; discs of abdominal terga very finely and rather closely punctate toward base; punctures becoming somewhat more widely separated toward the broad, impressed, apical margins which are to some degree invaded by exceedingly minute and sparse punctures, tergum 1 impunctate laterally and basally, median punctures very minute, and tergum 5 becoming very sparsely and finely punctate apically; pseudopygidium very short, transverse, forming the rather short, truncate, apical margin of tergum 5, densely covered with suberect, silvery tomentum; pubescence very short and thin, entirely white, somewhat more copious on face, cheeks and propodeum, hardly evident on abdomen dorsally, becoming somewhat more conspicuous apically, apex of sternum 5 with a small tuft of elongate, convergent, fuscous hairs on each side of mid-line.

MALE—Length 5.5-7 mm.; lateral ocelli nearer margin of vertex than to each other; cheeks considerably narrower than eyes, posterior margin subcarinate; antennal scape only slightly swollen, apex deeply excavated, completely enclosing pedicel, longer side of basal segment of flagellum considerably shorter than segment 2, median segments slightly

longer than broad; mandibles slender and simple apically; wings hyaline, faintly infuscated apically, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining between very fine and rather sparse punctures; posterior margin of scutellum only slightly grooved medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, a very narrow line below eye at base of mandibles, narrow lateral facial maculae ending narrowly on eye margin at level of antennae, and antennal scape, bright yellow; face, vertex and cheeks otherwise black; antennal flagellum brownish-testaceous; tubercles and tegulae yellowish-testaceous, thorax otherwise entirely black; legs testaceous in large part, mid and hind femora more or less blackened, spurs pale yellow; abdominal terga reddish in large part, but 2 and 3 with broad, basal, transverse maculations which are very slightly interrupted medially, forming nearly complete bands, 3-5 often with more obscure, submedian or apical, yellow maculations; tergum 1 piceous across base, yellowish-ferruginous medially, forming a vague, transverse band, reddish apically; broad apical margins of following terga becoming yellowish-hyaline; vertex, face above antennae and upper part of cheeks very coarsely and deeply rugoso-punctate, cheeks much more finely so below; supraclypeal area and clypeus very minutely and rather vaguely punctate, the dark lateral areas with coarser, close punctures, but these very sparse on maculated areas; scutum, scutellum and mesopleura coarsely rugose, scutellum and propodeum rather finely so, triangle dull and densely tessellate below, becoming rather coarsely rugoso-striate along upper margin; discs of abdominal terga very finely and rather closely punctate basally, punctures becoming more minute and widely separated toward the depressed apical margins, these invaded in part by exceedingly minute, vague punctures; pubescence entirely whitish, short but rather copious over head and thorax, very fine and sparse on abdomen dorsally, finer and more elongate on the sterna, becoming more copious apically, sternum 6 with considerable dense, suberect, pale pubescence apically; median length of pygidial plate about equal to basal width, rather strongly narrowed apically, apex deeply incised, margins carinate, surface very fine and closely punctate; exposed sternal plates unmodified, sternum 6 strongly narrowed to the narrowly rounded apex; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Minnesota to Quebec and Maine, south to Georgia, March to June.

FLOWER RECORDS — *Amelanchier, Claytonia, Crataegus, Malus, Pyracantha, Salix, Senecio* and *Stellaria.* Robertson (1929) records *sayi* on *Antennaria, Cercis, Chaerophyllum, Collinsia, Dentaria, Isopyrum, Nothoscordum, Osmorrhiza, Ranunculus, Ribes, Rubus, Thaspium, Viburnum, Viola, Zanthoxylum* and *Zizia.*

Nomada (Nomada) skinneri Cockerell
(Fig. 107)

Nomada skinneri Cockerell, 1908. Ent. News 19, p. 323. ♀.

FEMALE—Length 9-12 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks fully as broad as eyes, posterior margin sharply carinate; longer side of basal segment of flagellum equal to segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally becoming rather deeply infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd very much broader than 3rd anteriorly, veins testaceous to piceous, basal vein nearly interstitial with transverse median; tegulae shining, punctures exceedingly minute and sparse, barely evident along inner margin; pronotal collar rather sharply carinate, lateral angles distinct; posterior margin of scutellum only very slightly impressed medially; front coxae not spinose; apex of hind tibiae with two or three rather short but very robust spine-like bristles and a pair of more slender and elongate, setae-like bristles; clypeus, labrum and mandibles testaceous, eyes completely encircled with a testaceous band, this broader above, nearly meeting ocelli; broad median area of face to clypeal margin, vertex, area around ocelli, and posterior two-thirds of cheeks, black; antennal scape and base of flagellum testaceous, following segments brownish-testaceous below, more piceous above; scutum, scutellum and pleura largely ferruginous, prothorax laterally, metapleura, and propodeum in large part, black; scutum somewhat blackened along anterior margin and with a median, rather broad, black band; mesopleura black beneath and with a very limited black area below wing bases; posterior face of propodeum with some vague, pale maculations evident; coxae largely black, becoming somewhat testaceous apically, front and middle trochanters testaceous, hind trochanters and all the femora more or less piceous, becoming to some degree

ferruginous or testaceous apically, tibiae and tarsi reddish-testaceous, spurs pale yellow; abdominal terga largely ferruginous, tergum 1 piceous at base and somewhat darkened along apical margin; tergum 2 with broad, lateral, yellow maculae which are widely separated; tergum 3 with a similar but much smaller pair of maculations, and 4 and 5 without maculae; abdominal sterna largely testaceous, without maculations; punctures of face coarse and deep, well separated above antennae, sometimes widely so, becoming finer and closer on supraclypeal area, clypeus shining, with barely visible, minute, slightly separated punctures; vertex coarsely and rather sparsely punctate medially, very minutely and quite sparsely so between ocelli and eyes, the surface shining, cheeks minutely punctate above, becoming rather dull and vaguely reticulate below; scutum shining between deep and distinct punctures, these quite coarse and well separated medially, especially toward posterior margin, somewhat finer and closer laterally; scutellum shining, punctures coarse, deep, irregular and quite sparse; pleura very coarsely reticulate above, punctures becoming somewhat more distinct beneath; propodeum quite finely and shallowly rugose, lateral faces becoming rather smooth below, triangle smooth and impunctate below, becoming rather coarsely striate along upper margin; discs of abdominal terga with minute, slightly separated punctures, tergum 1 practically impunctate and shining, the depressed, apical margins of the following terga rather broadly impunctate, invaded only slightly by scattered, minute punctures; pseudopygidium extensive, covering about half the median length of the disc of tergum 5, median length about half its apical width, apex slightly incurved, surface densely covered with minute, silvery tomentum, visible only at certain angles; pubescence short, in part erect, head and thorax with fine, subappressed, pale pubescence and scattered suberect, somewhat darker hairs, surface not obscured; abdomen dorsally with hardly evident pubescence, sterna with only scattered somewhat elongate, very fine pale hairs, sternum 5 apically with a fringe of stout, curved, convergent hairs on each side of mid-line.

MALE—Length 9 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks nearly as broad as eyes, posterior margin sharply carinate; antennal scape somewhat swollen, apex deeply excavated and completely enclosing pedicel, basal segment of flagellum much shorter than segment 2, the shorter side no longer than the apical width, median segments somewhat longer than broad; mandibles slender and simple, outer margin with a slight angle at basal third; wings hyaline basally becoming lightly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins and stigma testaceous, basal vein very slightly basad of transverse median; tegulae shining, punctures exceedingly minute and sparse; pronotal collar sharply carinate, lateral angles distinct; posterior margin of scutellum rather deeply grooved medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, base of mandibles, and narrow, lateral, facial maculae, bright yellow, the maculae ending narrowly but rather abruptly at level of antennae on eye margin; upper margin of clypeus very narrowly blackened, and entire face, vertex and cheeks otherwise black; antennal scape bright yellow anteriorly, becoming piceous posteriorly, basal segment of flagellum testaceous, the following segments more brownish-testaceous beneath, piceous above; tubercles testaceous, tegulae somewhat more yellowish; scutellum dull reddish posteriorly and above, thorax otherwise black; abdominal tergum 1 piceous basally, becoming somewhat more reddened apically; tergum 2 with a pair of lateral, very large, bright yellow maculae which are widely separated, otherwise ferruginous, and tergum 3 ferruginous, with a pair of similar but smaller lateral maculations; terga 4 and 5 somewhat more piceous, the broad, apical margins more or less yellowish-hyaline, 6 somewhat more testaceous; basal abdominal sternum piceous, the following sterna more testaceous, with some piceous infusions; face and vertex coarsely, deeply and rather closely punctate, punctures below antennae somewhat more shallow and vague, maculated areas smooth and shining, with hardly evident punctures, and punctures of clypeus extremely minute and barely visible; cheeks rather closely, shallowly and quite finely punctate, becoming somewhat more deeply so beneath; scutum coarsely and deeply rugoso-punctate medially, becoming more definitely rugose anteriorly and laterally; scutellum shining between coarse, deep and well separated punctures; pleura very coarsely reticulate above, becoming somewhat more distinctly and finely punctate below; propodeum more finely reticulate, lateral faces becoming rather smooth below and anteriorly, triangle smooth below, becoming rather coarsely striate across upper margin; abdominal tergum 1 impunctate laterally and basally, with some barely evident, minute, well separated punctures medially; discs of the following terga very finely and rather closely punctate, the impressed apical margins largely impunctate, invaded only slightly by scattered minute punctures, the

more apical terga becoming somewhat more coarsely, deeply and sparsely punctate apically; pubescence entirely pale, very thin above, somewhat more copious on head beneath and on thorax laterally and beneath, barely evident on abdomen dorsally, sterna with very fine, scattered, suberect, pale hairs, sternum 6 becoming rather densely short pubescent toward apex; median length of pygidial plate about equal to basal width, quite strongly narrowed apically, apex deeply incised, margins carinate, surface finely and rather closely punctate; exposed sternal plates unmodified; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION — North Carolina to Connecticut, June and July.

FLOWER RECORD — *Galax*.

Nomada sobrina new species
(Fig. 107)

MALE—Length 9 mm.; lateral ocelli subequally distant from margin of vertex and each other; cheeks much narrower than eyes, posterior margin not carinate; antennal scape quite strongly swollen, apex deeply excavated and partially enclosing pedicel, basal segment of flagellum much shorter than segment 2, median segments somewhat longer than broad; mandibles slender and simple apically; wings hyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, 2nd and 3rd about equal anteriorly, veins and stigma testaceous, basal vein much basad of transverse median; tegulae shining, punctures very fine and quite sparse toward outer margin; posterior margin of scutellum quite deeply grooved medially; front coxae not spinose; hind femora slender and unmodified; clypeus, labrum, mandibles, a small spot on supraclypeal area, rather extensive facial maculae, and cheeks below, bright yellow, eyes nearly encircled with yellowish-ferruginous, the band becoming ferruginous above; median area of face around antennae and ocelli, and posterior half of cheeks, black, this area reaching upper margin of clypeus; antennal scape bright yellow anteriorly, becoming piceous posteriorly near apex, flagellum testaceous beneath, upper surface more piceous toward base, more ferruginous apically; pronotal collar, tubercles, scutellum, and a transverse band on mesopleura, bright yellow, the mesopleural maculation bordered above with ferruginous; scutum bright ferruginous, with a broad median black band; mesopleura below and more narrowly above, metapleura and entire propodeum, black; tegulae yellowish-testaceous; coxae largely black, becoming somewhat yellowish toward apex, the trochanters testaceous, with piceous infusions beneath, front and mid femora piceous basally, otherwise testaceous, the hind femora more fully piceous, all tibiae and tarsi entirely testaceous, spurs pale yellow; abdominal terga chiefly ferruginous, tergum 1 piceous across basal half, 2 and 3 with extensive, lateral, yellow maculae, those on 2 nearly meeting medially, more widely separated on 3, tergum 3 more piceous, with small, lateral, yellow maculations that are widely separated, 5 and 6 more ferruginous, 5 with vague, subapical, lateral maculations, 6 with a rather extensive, median, yellow maculation; abdominal sterna piceous in part, the more apical plates becoming testaceous; face, vertex and cheeks above very coarsely and deeply rugoso-punctate, cheeks becoming somewhat more shallowly rugose below, lower part of face somewhat more finely rugoso-punctate, maculated areas with very fine and sparse punctures; clypeus minutely, closely and vaguely punctate; scutum very coarsely and deeply rugoso-punctate, punctures of scutellum deep but rather variable in size, and mesopleura rather coarsely reticulate above, becoming somewhat more finely but deeply and closely punctate below; posterior face of propodeum rather smooth but dull, lateral faces finely and irregularly rugose, triangle rather smooth below, becoming rather finely long striate across upper margin; discs of abdominal terga very finely and closely punctate, tergum 1 impunctate laterally and basally, impressed apical margins invaded by scattered, very minute punctures nearly to the narrowly impunctate rims; pubescence entirely pale, very short, somewhat more copious but largely appressed on face, somewhat more copious on thorax, partially hiding surface beneath, very short and hardly evident on abdomen dorsally, more evident toward apical impressed areas of the sterna, sternum 6 quite densely short pubescent toward apex; median length of pygidial plate very slightly longer than basal width, apex rather strongly narrowed and deeply emarginate, margins strongly carinate, surface with fine and very close punctures; exposed sternal plates unmodified; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

TYPE—Holotype: Male, Macomb Co., Mich., May 28, 1949 (R. R. Dreisbach) [author's coll.].

Nomada (Nomada) sphaerogaster Cockerell

Nomada sphaerogaster Cockerell, 1903. Acad. Nat. Sci. Phila. Proc. 55, p. 611. ♀.

This description was made from the type in the Philadelphia Academy of Science. No other specimens have been seen.

FEMALE—Length 8 mm.; lateral ocelli considerably nearer margin of vertex than to eyes; cheeks subequal to eyes in width; longer side of basal segment of flagellum shorter than segment 2, median segments very slightly longer than broad; clypeus very short, median length only about a fourth the breadth, with erect, dark hairs; mandibles simple; wings slightly infuscated, veins testaceous to brownish, stigma somewhat darker, 3rd submarginal cell narrower than 2nd anteriorly, basal vein very slightly basad of transverse median; tegulae yellow, shining, sparsely and minutely punctate; scutellum not grooved; front coxae not spined; apex of hind tibiae with a row of four or five rather short, brownish setae; head and thorax black, the labrum, mandibles except tips, clypeus, and very short lateral maculations, yellow; antennal scape yellowish anteriorly, flagella testaceous beneath, brownish above tubercles and a pair of blotches on scutellum, bright yellow; propodeum with a pair of very small, yellow spots in triangle; abdominal terga black, 1-4 with transverse yellow bands, interrupted medially except on 2 which is only subinterrupted, 5 largely yellow; legs black basally, the femora apically and all tibia and tarsi, yellow; head and thorax finely rugoso-punctate, but clypeus very minutely punctate; abdominal terga very minutely and quite closely punctate, rims narrowly impunctate; pseudopygidium short, of the usual form; pubescence of head and thorax quite copious and erect, but rather short, pale yellowish above, more whitish laterally and beneath; abdominal terga with only very short, thin and obscure pale pubescence.

TYPE LOCALITY — Riverton, N. J., 4-22.

Nomada townesi new species

MALE—Length 8 mm.; lateral ocelli much nearer margin of vertex than to each other, and much nearer each other than to eyes; cheeks somewhat narrower than eyes, posterior margin not noticeably carinate; antennal scape somewhat swollen, apex deeply excavated and enclosing the pedicel, longer side of basal segment of flagellum about equal to segment 2, median segments slightly longer than broad; mandibles slender and simple; wings subhyaline, becoming faintly infuscated apically, but with a distinct hyaline area just beyond the submarginal cells, veins and stigma brownish-testaceous, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, basal vein very slightly basad of transverse median, almost interstitial; tegulae testaceous except along inner margin, shining, finely and rather sparsely punctate; scutellum rounded, not at all impressed medially; front coxae not spinose; hind femora simple and unmodified; clypeus except upper margin, labrum, mandibles except tips, and very small lateral face marks, bright yellow, head otherwise black; antennal scape yellow anteriorly, blackish posteriorly, flagellum testaceous beneath, blackish above toward base, becoming testaceous apically; margin of tubercles narrowly testaceous, thorax otherwise entirely black; coxae and trochanters black, femora more or less blackened posteriorly, but anterior face of front and mid femora testaceous, the hind femora testaceous apically; tibiae largely testaceous but somewhat blackened on outer face medially; tarsi testaceous, spurs pale yellow; basal abdominal tergum black basally, with narrow, lateral maculations which are somewhat separated medially, apical margin rather broadly testaceous-hyaline; terga 2 and 3 with broad, lateral, yellow maculations which are strongly narrowed toward mid-line, nearly meeting, basal area blackish, apical impressed areas yellowish-hyaline; terga 4-6 with transverse, yellow bands which are narrowly constricted medially but not interrupted; abdominal sterna dark, with rather vague, transverse, yellowish maculations; head and thorax coarsely rugoso-punctate, but lower portions of face and clypeus more finely so, the lateral maculated areas smooth and only sparsely punctate; abdominal terga finely but closely, deeply and distinctly punctate, punctures invading apical impressed areas nearly to rims, these very narrowly impunctate; pubescence erect and rather copious but not hiding surface, somewhat yellowish above on head and thorax, more whitish below and on thorax posteriorly, very short and thin, barely evident on the more basal abdominal terga, becoming somewhat more elongate apically; pygidial plate slightly narrowed apically, apex rather broadly emarginate, margins carinate, surface shallowly but closely punctate; sternum 8 with a slender apical process; gonocoxites of genital armature quite similar to those in *fragariae* (fig. 105).

TYPE — Holotype: Male, Takoma Pk., Md., Mar. 26, 1944 (H. & M. Townes) [Townes].

Nomada tyrrellensis new species

FEMALE—Length 8 mm.; lateral ocelli considerably nearer margin of vertex than to each other or to eyes; cheeks nearly as broad as eyes, posterior margin not distinctly carinate; basal segment of flagellum rather elongate but the longer side slightly shorter than segment 2, median segments considerably longer than broad; mandibles slender and simple; wings subhyaline basally, becoming somewhat clouded apically, with a distinct hyaline area just beyond 3rd submarginal cell, the 2nd and 3rd subequal anteriorly, veins and stigma piceous, basal vein much basad of transverse median; tegulae finely and quite closely punctate; scutellum with a broad and deep median groove; front coxae without spines; apex of hind tibiae with two or three very fine, elongate hairs; head largely red, face with some black between and just above antennae, around ocelli and on posterior half of cheeks; thorax largely red, but scutum with a distinct median black line, prothorax black laterally, metapleura margined with black but ferruginous medially, propodeum almost entirely black; head and thorax very coarsely rugoso-punctate, but becoming quite finely and less distinctly so on face below; punctures of scutum, scutellum and pleura coarse and very close; propodeum rather coarsely punctate on posterior face, triangle rather smooth but dull, becoming coarsely short-striate along upper margin, lateral faces somewhat more finely and closely punctate; the more basal areas of abdominal terga 2-5 with minute, rather close but distinct punctures, those on 1 very minute and barely visible; pseudopygidium transverse, very short, rather densely covered with silvery tomentum; pubescence extremely short and rather thin, quite copious on head and lower portions of thorax; abdominal terga largely red but 2 and 3 with rather large, widely separated yellow spots, pubescence very short and thin, largely silvery-white, hardly visible on dorsum of thorax and on abdominal terga.

TYPES—Holotype: Female, Tyrrell Co., N. C., May 1, 1954 (D. M. Weisman) [author's coll.]. Paratypes: NORTH CAROLINA: 2 ♀♀, Raleigh, May 25, 1941 and April 7, 1954; 1 ♀, Pettigrew State Park, Tyrrell Co., May 27, 1959, (on *Erigeron*); 1 ♀, White Lake, Bladen Co., Mar. 14, 1953 (on *Amelanchier*) (both Mitchell). FLORIDA: 1 ♀, Alachua Co., April 7, 1954 (H. V. Weems, Jr.); 1 ♀, Orlando, Mar., 1944 (R. & G. Bohart).

Paratypes are in collections of the Florida Plant Board, R. M. Bohart and the author.

Nomada ulsterensis new species
(Fig. 107)

Nomada (Nomada) subnigrocincta Swenk, 1915. Nebr. Univ. Studies 15, p. 155. ♂. (wrongly associated with holotype ♀)

MALE—Length 6.5 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks nearly equal to eyes in width, posterior margin not carinate; antennal scape only slightly swollen, apex rather deeply excavated, partially enclosing pedicel, longer side of basal segment of flagellum slightly shorter than segment 2, median segments slightly longer than broad; mandibles slender and simple; wings hyaline, very faintly infuscated along apical margin, with the usual three submarginal cells, 2nd and 3rd nearly equal anteriorly, veins testaceous, basal vein interstitial with transverse median; tegulae shining, punctures minute, scattered and rather sparse; posterior margin of scutellum rounded, not appreciably depressed or grooved; front coxae not spinose; hind femora unmodified; clypeus except upper margin, labrum, mandibles except tips, small lateral facial maculae, and anterior face of antennal scape, yellowish-testaceous, flagellum testaceous; head otherwise black; tubercles, tegulae, tibiae and tarsi testaceous at least in large part; spurs pale yellow, femora more piceous, becoming testaceous apically or along upper and anterior faces; thorax otherwise black; abdominal terga more or less reddish, basal tergum becoming more piceous at extreme base, terga 2-6 with more or less conspicuous, yellow maculae laterally, these extensive on 2, apical margins of terga yellowish-hyaline, more ferruginous basally; punctures coarse, close and deep on face above antennae, on vertex and cheeks, and between antennae and clypeus below, the clypeus and lateral maculated areas with very obscure, sparse punctures; scutum, scutellum and mesopleura coarsely and densely rugoso-punctate, lateral faces of propodeum dull, tessellate, with scattered, obscure and rather fine reticulations, posterior face more fully rugose, triangle impunctate but becoming rather coarsely striate along upper margin; punctures of abdominal terga minute, rather close throughout, barely visible toward base of tergum 1, evident but very fine on the following terga, minute and close over basal areas of each disc, becoming hardly visible apically; pubescence entirely pale, short but rather copious over head and thorax, hardly visible on abdomen both dor-

sally and ventrally; median length of pygidial plate somewhat greater than basal width, rather strongly narrowed apically, tip narrowly subtruncate and shallowly emarginate, margins carinate, surface obscurely but rather closely punctate; abdominal sterna dark; sternum 8 with a slender apical process; gonostyli of genital armature as shown (fig. 107).

TYPES—Holotype: Male, Slide Mt., Ulster Co., N. Y., June 12, 1941 (H. Dietrich). Paratypes: 1 ♂, Washington, D. C., May 15, 1944 (G. E. Bohart).

It seems probable that the male from Pennsylvania associated by Swenk with his *subnigrocincta* is this species.

Nomada (Nomada) valida Smith

Nomada valida Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 246. ♀.
Nomada valida Cockerell, 1905. Amer. Ent. Soc. Trans. 31, p. 310.

FEMALE—Length 8-9 mm.; lateral ocelli slightly nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin subcarinate; longer side of basal segment of flagellum equal to segment 2, median segments somewhat longer than broad; mandibles rather robust, entire; wings faintly yellowish, becoming slightly infuscated along outer margin and in marginal cell, with the usual three submarginal cells, 2nd slightly broader than 3rd anteriorly, veins testaceous to piceous, stigma somewhat more reddish, basal vein very slightly basad of, or interstitial with, transverse median; tegulae shining between fine and rather deep punctures, these close along inner margin, becoming very sparse toward outer margin; posterior margin of scutellum rounded, without a definite median impression; front coxae not spinose; apex of hind tibiae with a row of 5 or 6 rather short, fuscous, seta-like bristles; face laterally and below reddish-testaceous, eyes completely and rather broadly encircled, a broad median area above antennae, another surrounding ocelli and posterior two-thirds of cheeks, black, the clypeal suture narrowly black; antennae testaceous; tubercles and tegulae yellowish-testaceous; pronotal collar, mesopleura above, scutum and scutellum largely red, propodeal triangle reddish on each side; pleura below and along the narrow anterior and upper margins, scutum, anteriorly and along mid-line, metapleura entirely, and propodeum other than triangle, black; coxae largely black, but legs otherwise testaceous in large part, mid and hind femora more or less piceous basally, spurs pale yellow; discs of abdominal terga yellowish-testaceous, tergum 1 piceous or black basally, apical impressed areas of 1-3 more ferruginous, that of 4 more yellowish-hyaline; sterna largely yellowish-testaceous, apical margins yellowish-hyaline, vertex and face above antennae coarsely rugose, cheeks somewhat more finely so, supraclypeal area and clypeus very finely and quite densely punctate, lateral areas of face below with coarse, deep and close punctures; scutum, scutellum and mesopleura coarsely rugose, pleura below becoming somewhat more distinctly punctate; propodeum very finely and densely rugose, triangle somewhat shining and smoother below, very finely rugose medially, coarsely so along upper margin; abdominal terga minutely and quite closely punctate toward base, punctures becoming somewhat more widely separated and more minute on apical impressed areas, only the narrow apical rims entirely impunctate; pseudopygidium transverse, extremely short, forming the broadly truncate, apical margin of tergum 5, densely clothed with suberect, silvery tomentum; face with quite elongate, conspicuous, erect, fuscous hairs, cheeks with more whitish but erect pubescence; thorax with erect, more yellowish pubescence above, this becoming more fuscous below, whitish on propodeum; abdomen dorsally very obscurely and finely pubescent, hairs becoming more elongate and conspicuous apically, elongate but very fine and rather sparse on sternal plates, more evident along the impressed apical areas; apex of sternum 5 with a rather broad and dense tuft of elongate, curved and convergent, more or less fuscous hairs on each side of mid-line.

DISTRIBUTION — British Columbia to New York and Nova Scotia, in April.

Nomada (Nomada) vicina vicina Cresson
(Fig. 107)

Nomada vicina Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 292. ♀. (♂ misident.)

FEMALE—Length 9 mm.; lateral ocelli much nearer margin of vertex than to each other; cheeks somewhat narrower than eyes, posterior margin strongly carinate; longer side of basal segment of flagellum slightly shorter than segment 2, median segments very slightly longer than broad; mandibles slender and simple apically; wings lightly infuscated, becoming quite deeply so along apical margin and in marginal cell, with a hyaline area just beyond the marginal and discoidal cells, with the usual three submarginal cells, 2nd much broader anteriorly than 3rd, veins largely piceous, the stigma more testaceous, basal vein interstitial, or nearly, with transverse

median; tegulae shining, punctures deep and distinct but rather fine, close along inner margin, becoming sparse along outer margin; posterior margin of scutellum quite deeply depressed medially; front coxae not spinose; apex of hind tibiae with three short, robust, seta-like bristles; face, vertex and cheeks black in large part, eyes completely but narrowly encircled with ferruginous, labrum and mandibles ferruginous, the clypeus black except for the very narrow apical margin; scape, pedicel and basal segment of flagellum more testaceous, the more apical segments brownish-testaceous below, more piceous above; tubercles and tegulae testaceous; pronotal collar, large mesopleural maculations, lateral margins and a pair of elongate submedian maculations on scutum, and scutellum entirely, ferruginous; propodeum posteriorly with a pair of widely separated, small, yellowish maculations, thorax otherwise black; coxae more or less black basally, becoming somewhat reddened apically, front and middle legs largely reddish-testaceous, hind pair more ferruginous, femora piceous posteriorly, all spurs pale yellow; basal abdominal tergum largely black, with a pair of submedian, transverse, yellow maculations that are slightly separated medially; tergum 2 black, becoming somewhat reddened apically, with a pair of broad, transverse, yellow maculations that nearly meet medially; tergum 3 black across disc, apical margin more ferruginous, with a pair of sub-basal transverse, widely separated maculations; tergum 4 with a pair of submedian, transverse, yellow maculations that nearly meet medially and are deeply emarginate on each side posteriorly; tergum 5 with a broad, transverse, yellow band that is deeply emarginate on each side apically; abdominal sterna 2-3 with rather widely separated, lateral, yellow maculations, 4 with a median, more transverse, yellow band that is quite short; apical margins of the sterna rather broadly ferruginous-hyaline, sternum 5 piceous; vertex and face above antennae very deeply, coarsely, distinctly and closely punctate, becoming more finely and shallowly so on cheeks below, punctures quite coarse and distinct on each extreme side below antennae, fine and densely crowded on supraclypeal area and clypeus; scutum, scutellum and mesopleura coarsely and deeply punctate, punctures becoming much finer and quite densely crowded on scutum laterally, well separated medially, rather widely separated on scutellum dorsally, somewhat separated on pleura below, becoming closely crowded above; propodeum very finely and closely rugosopunctate, becoming somewhat smoother and more shining on each side below, triangle densely tessellate below, becoming irregularly reticulate above; discs of abdominal terga very finely and closely punctate basally, the punctures becoming somewhat more distinctly separated toward the impressed apical margins, these rather broadly impunctate; tergum 1 becoming impunctate laterally and basally; pseudopygidium transverse, very short, forming the rather narrow, truncate margin of tergum 5; pubescence extremely short, thin and inconspicuous, entirely pale where at all visible, apex of sternum 5 with a patch of elongate, brownish, convergent bristles on each side of mid-line.

MALE—Length 7-10 mm.; lateral ocelli considerably nearer margin of vertex than to each other; cheeks subequal to eyes in width, posterior margin carinate; antennal scape somewhat swollen, apex deeply excavated, completely enclosing pedicel, basal segment of flagellum very short, the shorter side only about half the length of segment 2, median segments only slightly longer than broad; mandibles slender and simple apically; wings lightly infuscated, becoming quite deeply so along apical margin and in marginal cell, a hyaline area just beyond the submarginal and discoidal cells, with the usual three submarginal cells, 2nd somewhat broader than 3rd anteriorly, veins chiefly piceous, stigma more testaceous, basal vein interstitial with transverse median; tegulae quite deeply, closely and rather finely punctate, becoming slightly separated toward outer margin; posterior margin of scutellum rather deeply depressed medially; front coxae not spined; hind femora unmodified, relatively slender; lower third of clypeus, labrum, mandibles and small facial maculae, ending very narrowly on eye margin slightly below level of antennae, yellow; head otherwise black; antennal scape bright yellow anteriorly, piceous above, flagellum brownish-testaceous below, more piceous above; tubercles and tegulae reddish-testaceous; pronotal collar, a pair of rather vague lateral maculations on mesopleura, and entire scutellum, ferruginous; thorax otherwise black; basal abdominal tergum largely black, with a pair of submedian, transverse, yellow maculations that are slightly separated medially; tergum 2 black, becoming somewhat reddened apically, with a pair of broad, transverse, yellow maculations that nearly meet medially; tergum 3 black across disc, apical margin more ferruginous, with a pair of subbasal, transverse, widely separated maculations; tergum 4 with a pair of submedian, transverse, yellow maculations that nearly meet medially and are deeply emarginate on each side posteriorly; tergum 5 with a broad, transverse, yellow band that is deeply emarginate on each side apically; discs of abdominal

sterna 2-6 with extensive yellow maculations, more or less interrupted medially on the more basal sterna, apical margins of the sterna broadly testaceous-hyaline; coxae more or less blackish, becoming somewhat testaceous apically, legs otherwise largely testaceous, front femora and tibiae more yellowish anteriorly, mid and hind femora with small, yellow maculations at extreme tips, hind femora piceous posteriorly, spurs pale yellow; vertex and face above antennae coarsely, deeply and closely punctate, punctures becoming much finer on cheeks below and on supraclypeal area and clypeus, rather deep and distinct on each side of face below, maculated areas largely impunctate; scutum, scutellum and mesopleura coarsely and deeply punctate, much more finely and densely so on scutum laterally, the more median punctures coarse and distinct, those on scutellum widely separated, those on pleura below somewhat finer but distinctly separated, becoming closely crowded above; propodeum rather finely rugose, becoming somewhat shining on each side below, triangle dull and densely tessellate, becoming rather finely short-striate along upper margin; discs of abdominal terga very finely, closely and quite deeply punctate, punctures becoming somewhat more distinctly separated on apical impressed areas, only the narrow apical rims impunctate; tergum 1 becoming impunctate laterally and basally, the more apical terga with somewhat coarser and deeper punctures apically; pubescence short and inconspicuous in general, rather dense on face and cheeks, quite dense on propodeum posteriorly, entirely pale, hardly evident on abdomen dorsally, the sterna with very short scattered fine hairs, sternum 6 with short erect hairs apically; median length of pygidial plate much greater than basal width, only slightly narrowed apically, apex rather deeply emarginate, margins carinate, surface closely punctate; exposed sterna unmodified, sternum 6 subtriangular, apex very narrowly rounded; sternum 8 with a slender apical process; gonocoxites of genital armature as shown (fig. 107).

DISTRIBUTION—Michigan to Quebec, the New England states and New Jersey, August and September.

FLOWER RECORD—*Solidago.*

The subspecific designation of *vicina* is made necessary by the recognition of another subspecies, *stevensi* Swenk, which has not been collected east of the Dakotas (see p. 406).

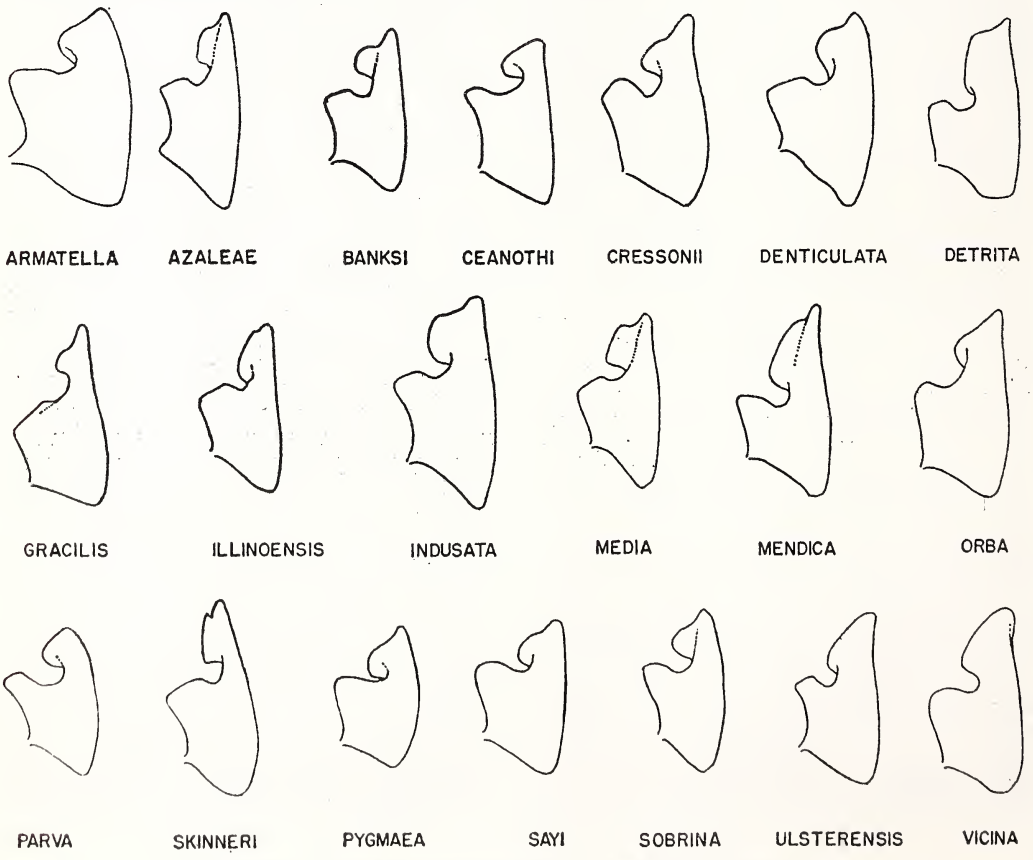


Figure 107—Right gonocoxite in males of *Nomada*.

Table 13—Distribution of species of *Nomada (Nomada)* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Nomada (Nomada)	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
armatella	X			X				X																			
augustiana																										X	
azaleae																						X					
banksi								X	X				X									X					
capillata				X																							
ceanothi													X			X			X			X					
composita						X		X																			
cressonii	X	X		X		X	X	X	X		X		X		X			X	X	X	X	X					
crudelis																										X	
decepta								X					X														
denticulata	X			X				X	X		X		X		X				X		X	X	X			X	
depressa	X				X			X				X	X					X	X			X					
detrita		X																									
dreisbachi	X			X				X																			
florilega	X					X		X												X		X					
gracilis	X			X									X														
illinoensis				X				X	X		X		X			X			X	X	X	X				X	
indusata																						X				X	
inepta	X	X		X									X									X					
kingstonensis					X																						
lehighensis								X				X	X		X					X						X	
media																					X	X					
mendica		X	X																								
minima																X			X			X					
nigrocincta (?)	X																										
orba													X														
parva					X			X	X						X	X		X	X			X		X			
pygmaea	X			X				X		X	X		X		X				X	X							
salicis									X																		
sayi	X			X	X			X	X				X		X	X		X	X	X	X	X				X	X
skinneri						X									X							X					
sobrina								X																			
sphaerogaster														X													
townesi																X											
tyrrellensis																						X					X
ulsterensis													X		X					X							
valida													X														
vicina	X	X		X		X		X					X	X													

Epeolus Latreille

(Figs. 67 & 108)

Epeolus Latreille, 1802. Hist. Nat. Fourmis, p. 427. Type: *(Nomada variegata* Fabricius) = *Apis variegata* Linnaeus. Monob.

Pyrrhomelecta Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 66. Type: *Epeolus glabratus* Cresson. Monob. and orig. desig.

Argyroselenis Robertson, 1903. Canad. Ent. 35, p. 284. Type: *Triepeolus minimus* Robertson. Monob. and orig. desig.

Epeolus Cockerell, 1928. Colo. Univ. Studies 16, pp. 104-107. (key)

This is a quite extensive group of bees, parasitic usually on *Colletes*. It is closely related to *Triepeolus* and resembles that genus in having acutely pointed axillae and in being variously ornamented with appressed pale tomentum. The marginal cell is rather short, its length not exceeding the distance from its tip to the apex of the wing. The maxillary palpi are short, 2-segmented, with a fixed basal segment and one free apical segment. The eyes are strongly convergent below; the cheeks are very narrow, one half or less the width of the eyes; and the antennal scape is short, little more than half as long as distance from the fossa to the anterior ocellus.

Except for the apical segments of the abdomen and genital structures, species of *Epeolus* are usually monomorphic, with little or no difference between the sexes with respect to size, color, pattern of pubescence and sculture. The chief differences are as follows:

Females—Antennae 12-segmented; pseudopygidium very short or small, covered with very fine and dense, silvery tomentum; sternum 6 composed of a pair of lateral processes connected by a rather broad flattened plate, the apex of each process denticulate. (fig. 108).

Males—Antennae 13-segmented; face usually more densely tomentose; pygidial plate usually very short, its basal width about equal to the median length; sternum 7 rather broad and flat, constricted near base and slightly expanded apically, apex broadly truncate; sternum 8 cruciform (fig. 109); genital armature as shown.

KEY TO SPECIES

Females

1. Punctures of pleura below very coarse and well separated 2
   Pleura below closely punctate or rugose, with only very narrow, intervening spaces 4

2. Abdominal terga not fasciate, 1 and 2 ferruginous, impressed apical third of each black . . *glabratus* Cresson (p. 447)
   Abdominal terga to some degree fasciate 3

3. Basal abdominal tergum with a broad, yellow, basal fascia, 2 with a similar but narrow apical fascia, abdomen otherwise without fasciae .... *bifasciatus* Cresson (p. 443)
   Abdominal terga 1-4 with conspicuous pale fasciae .... *lectoides* Robertson (p. 451)

4(1). Axillae robust, inner margin of each joined to side of scutellum for nearly the entire length, produced only slight-

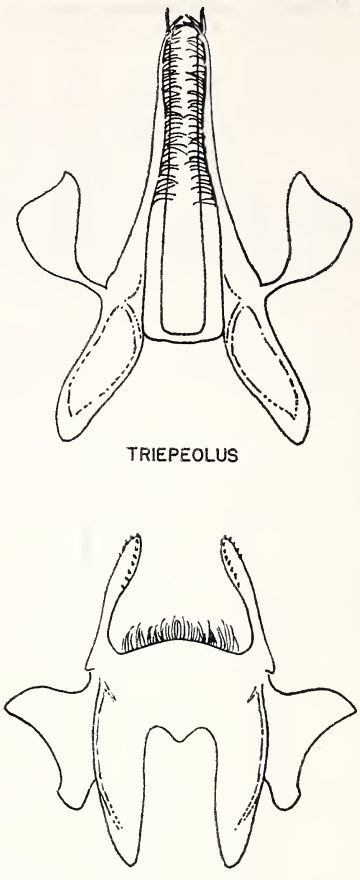


Figure 108
Sternum 6 in females of *Epeolus* and *Triepeolus*.

ly beyond, but tips fully attaining posterior, transverse line of scutellum . 5
Axillae either small, or tips conspicuously diverging from sides of scutellum. 9

5. Much of thorax, and usually basal abdominal tergum, bright ferruginous ... . *floridensis* new species (p. 446)
Scutum, pleura and entire abdomen black 6

6. Slightly larger (10 mm.); axillae shorter, tips not protuberant, entirely black; spurs yellowish .... *autumnalis* Robertson (p. 442)
Usually smaller; axillae usually to some degree ferruginous and quite strongly protuberant 7

7. Abdominal fasciae interrupted medially on terga 1-4; scutellum entirely red, not at all impressed medially .... *howardi* new species (p. 447)
Abdominal fasciae uninterrupted except possibly on basal tergum; scutellum red or black, usually to some degree impressed or grooved medially 8

8. Pseudopygidium very narrow, its median length nearly equal to its breadth; scutellum black, with only a very slight median impression .... *pusillus* Cresson (p. 453)
Pseudopygidium fully twice as broad as its median length; scutellum black or red, usually quite deeply grooved medially ..... *scutellaris* Say (p. 454)

9(4). Scutellum largely or entirely red, usually in marked contrast to the generally black scutum 10
Scutellum black, the axillae either black or red 12

10. Abdominal terga 1 and 2 bright ferruginous; axillae acute, tips widely divergent from sides of scutellum .... *zonatus* Smith (p. 456)
Abdomen entirely black dorsally 11

11. Axillae carinate and much thickened laterally, with broad lateral surfaces, tips somewhat compressed; fasciae fulvous, interrupted medially .... *carolinus* new species (p. 445)
Axillae carinate laterally, tips more flattened; the whitish fasciae complete .. .. *australis* new species (p. 441)

12(9). Tips of axillae strongly divergent from sides of scutellum, the free part nearly equalling the basal part bordering the scutellum 13
Axillae little if any divergent from sides of scutellum, the free part much shorter than the basal portion 16

13. Pleura shining between very coarse, slightly separated punctures .... *lectoides* Robertson (p. 451)
Pleura reticulate or closely punctate.. 14

14. Pleura very coarsely reticulate; scutellum more coarsely sculptured than scutum ..... *erigeronis* new species (p. 445)
Pleura more finely reticulate or closely and finely punctate; scutellum sculptured about as scutum 15

15. Abdominal fasciae narrower, somewhat removed from rims of terga toward mid line, those on 1-3 distinctly interrupted medially .... *vernalis* new species (p. 455)
Abdominal fasciae somewhat broader, quite apical in position except at mid line, only slightly interrupted on 1 and 2, complete on 3 and 4 .... *ilicis* new species (p. 448)

16(12). Scutum with an anterior, median, semi-circular patch of pale tomentum enclosing a very finely and densely rugose area; basal abdominal tergum with a triangular median black patch enclosed by the yellow, tomentose areas ..... *canadensis* new species (p. 444)
Scutum usually with a pair of lines or elongate patches of pale tomentum anteriorly, the punctures relatively distinct; basal abdominal tergum usually with a more quadrangular black patch 17

17. Punctures densely crowded and indistinct over lower half of pleura .... *minimus* Robertson (p. 452)
Lower half of pleura with distinct punctures which are at least slightly separated 18

18. Front wings with but two submarginal cells ... *lanhami* new species (p. 450)
Front wings with the usual three submarginal cells 19

19. Pseudopygidium exceedingly short and obscure, forming the very narrow, declivate, apical margin of tergum 5 .. .. *interruptus* Robertson (p. 449)
Pseudopygidium well developed, broadly subtriangular, median length considerable, but strongly narrowed laterally.. 20

20. Tomentose fasciae of abdominal terga conspicuously broad and complete; mandible without an inner angle or tooth ..... *australis* new species (p. 441)
Tomentose fasciae usually distinctly interrupted medially; mandible with a distinct, inner, submedian angle or tooth ..... *banksi* Cockerell (p. 442)

Males

1. Punctures of pleura below coarse and well separated, with distinct, shining, intervening spaces 2
   Pleura closely punctate below, with only very narrow interspaces evident 4

2. Abdominal terga not fasciate, 1 and 2 ferruginous, the impressed apical third of each black ..... *glabratus* Cresson (p. 447)
   Abdominal terga fasciate to some degree 3

3. Basal abdominal tergum with a broad, yellow, basal fascia, tergum 2 with a similar but narrower apical fascia, abdomen otherwise without conspicuous fasciae .. *bifasciatus* Cresson (p. 443)
   Abdominal terga 1-4 with conspicuous pale fasciae ..... *lectoides* Robertson (p. 451)

4(1). Axillae robust, inner margin of each joined to side of scutellum for nearly the entire length, produced only slightly beyond, but tips fully attaining posterior, transverse line of scutellum .. 5
   Axillae either small, or tips conspicuously diverging from sides of scutellum .. 9

5. Much of thorax, and usually basal abdominal tergum, bright ferruginous ..... *floridensis* new species (p. 446)
   Scutum, pleura and entire abdomen black 6

6. Slightly larger (10 mm.); axillae shorter, tips not protuberant, entirely black; spurs yellowish ..... *autumnalis* Robertson (p. 442)
   Usually smaller; axillae usually to some degree ferruginous and quite strongly protuberant 7

7. Abdominal fasciae interrupted medially on terga 1-4; scutellum entirely red, not at all impressed medially ..... *howardi* new species (p. 447)
   Abdominal fasciae uninterrupted except possibly on basal tergum; scutellum red or black, usually to some degree impressed or grooved medially 8

8. Pleura completely covered with silvery tomentum; scutellum black, with only a very slight, median impression ..... *pusillus* Cresson (p. 453)
   Lower half of pleura largely bare, exposing the closely punctate or rugose surface; scutellum usually quite deeply grooved medially ..... *scutellaris* Say (p. 454)

9(4). Tips of axillae strongly divergent from sides of scutellum, the free part nearly equalling the basal part bordering the scutellum 10
   Axillae little if any divergent from sides of scutellum, the free part much shorter than the basal portion 15

10. Abdominal terga 1 and 2 bright ferruginous; axillae acute, tips widely divergent from sides of scutellum ..... *zonatus* Smith (p. 456)
    Abdomen entirely black dorsally 11

11. Pleura shining between very coarse, slightly separated punctures ..... *lectoides* Robertson (p. 451)
    Pleura reticulate or closely punctate . 12

12. Axillae carinate and much thickened laterally, with broad, lateral surfaces, the tips somewhat compressed; fasciae fulvous, interrupted medially ..... *carolinus* new species (p. 445)
    Outer margins of axillae more rounded, if at all thickened; fasciae white or pale ochraceous 13

13. Abdominal fasciae narrow, distinctly interrupted medially and somewhat removed from rims of terga 1-3 ..... *weemsi* new species (p. 455)
    Abdominal fasciae interrupted only on terga 1 and 2, entire on 3-5, not much removed from apical margins 14

14. Pleura very coarsely reticulate; scutellum more coarsely sculptured than scutum .. *erigeronis* new species (p. 445)
    Pleura more finely reticulate; scutellum sculptured about as scutum ..... *ilicis* new species (p. 448)

15(9). Scutum with an anterior, median, semicircular patch of pale tomentum; mandible with a distinct, subacute, inner, subapical tooth ..... *canadensis* new species (p. 444)
    Scutum usually with a pair of lines or elongate patches of pale tomentum anteriorly 16

16. Punctures densely crowded and indistinct over lower half of pleura 17
    Lower half of pleura with distinct punctures which are at least slightly separated 20

17. Pygidial plate narrow and elongate .. 18
    Pygidial plate broadly rounded and short, basal width about equal to median length 19

18. Basal segment of flagellum slightly shorter than segment 2, even if measured on its longer side; abdominal tergum 2 with a small amount of yellowish tomentum on each side; antennae, basal

segments of legs, and spurs dark .... *oswegoensis* new species (p. 453)

Longer side of basal flagellar segment longer than segment 2; tergum 2 broadly whitish tomentose on each side; antennae beneath, and legs, largely ferruginous or testaceous, spurs pale yellow . *australis* new species (p. 441)

19(17). Mandibles with an acute, inner tooth which is slightly nearer apex than to base; mind and hind legs largely ferruginous. . *minimus* Robertson (p. 452)

Mandible with a more obtuse, submedian, inner angle; legs largely dark, only the tarsi somewhat reddened .... *banksi* Cockerell (p. 442)

20(16). Front wings with but two submarginal cells .... *lanhami* new species (p. 450)

Front wings with the usual three submarginal cells .... *interruptus* Robertson (p. 459)

Epeolus australis new species
(Fig. 110)

FEMALE—Length 7-8 mm.; black, basal segments of antennae, legs, tubercles and tegulae testaceous, segments of flagellum beyond the first more brownish; scutellum in part, and axillae entirely ferruginous, spurs pale yellow; mandibles testaceous at base, becoming piceous apically; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, about one third width of eye, posterior margin subcarinate, strongly narrowed below; median length of labrum about half the width, with a pair of subapical denticles that are obscured by rather dense, pale pubescence; inner margin of mandibles with a barely perceptible submedian angle; scutellum rounded posteriorly, with a very deep, median excavation or impression (fig. 110); tips of axillae projecting only slightly from sides of scutellum, reaching slightly beyond its mid transverse line; wings with the usual three submarginal cells, hyaline, very faintly clouded apically, veins brownish; most of head covered with short, pale tomentum, quite dense between eyes below ocelli and over clypeus, somewhat thinner on vertex, cheeks and upper part of face; venter of thorax rather thinly white tomentose, not entirely obscuring the surface, upper part of pleura very densely white tomentose; pronotum quite densely whitish tomentose, the tubercles more thinly covered with pale hairs, and with a quite distinct fringe of the same color; scutum with a pair of rather broad and extensive patches of pale tomentum on each side of midline anteriorly, the latero-anterior areas more thinly tomentose, lateral and posterior margins narrowly fringed with the same color; posterior face of propodeum largely covered with white tomentum, the triangular dorsal area relatively bare; metanotum and lower posterior surface of scutellum densely white tomentose; anterior face of basal abdominal tergum densely white tomentose, continuous laterally with a broad, dense, apical, transverse, tomentose band, the resulting median black patch broad and very short, covered with black tomentum, narrowed at each extreme side; terga 2-4 with similar, transverse, apical bands of white tomentum, discs covered with black tomentum, tergum 2 laterally with a basal area of white tomentum produced toward midline for a short distance, tergum 5 with an extensive area of white tomentum on each side, basal area black tomentose, this produced medially to margin of pseudopygidium; tegulae very finely and closely but quite distinctly punctate, the punctures fading out toward posterior margin; vertex, cheeks and upper part of face rather deeply and distinctly but quite coarsely punctate, the punctures becoming minute and densely crowded below, beneath the tomentum; scutum densely and rather finely rugoso-punctate throughout, scutellum and axillae somewhat more coarsely rugoso-punctate; lower portion of pleura rather finely rugoso-punctate, with a few irregular, narrow, shining spaces evident, upper surface densely and finely rugose beneath the tomentum; discs of abdominal terga very finely, closely and quite regularly punctate beneath dense black tomentum, punctures becoming progressively more minute and close toward the apical terga; median length of pseudopygidium about half the apical width.

MALE—Closely resembles female in most characters, but scutellum and axillae usually entirely black; posterior margin of scutellum less deeply grooved; silvery tomentum of face, pleura and venter of thorax more copious and dense; pygidial plate unusually narrow and elongate, median length much longer than the expanded basal width, rather narrowly rounded or subtruncate apically, margin carinate, surface shallowly pitted or punctate.

TYPES — Holotype: Female, Raleigh, N. C., May 19, 1950. Allotype: Southern Pines, N. C., May 12, 1950 (both Mitchell) [author's coll.]. Paratypes: NORTH CAROLINA: 1 ♀, Southern Pines, May 12, 1950; 2 ♀♀, Raleigh, May 19, 1950 (at nest site), and May 9, 1948 (on *Senecio)*; 1 ♀, Wake Co., June 9, 1960 (on *Ceanothus)*; 1 ♂, Umstead State Park, Wake Co., May 16, 1957 (on *Specularia)*; 1 ♂, Aberdeen, May 9, 1958 (on *Rubus)* (all

Mitchell); 1 ♀, Taylor's Bridge, Sampson Co., May 24, 1951 (H. T. Townes); 1 ♂, 1 ♀, Raleigh, April 1 and May 4. GEORGIA: 1 ♂, 1 ♀, Augusta, Richmond Co., April 26, 1959; 1 ♀, Fort Gordon, Richmond Co., May 8, 1958 (both R. R. Snelling).

Paratypes are in collections of R. R. Snelling and the author.

Epeolus autumnalis Robertson
(Fig. 110)

Epeolus autumnalis Robertson, 1902. Ent. News 13, p. 81. ♀.

Epeolus autumnalis Robertson, 1903. Canad. Ent. 35, pp. 287, 288. ♀.

Epeolus autumnalis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9-10 mm.; black, legs testaceous to yellowish in large part, tegulae testaceous, tubercles and mandibles more ferruginous, spurs yellow; lateral ocelli separated from margin of vertex by a space about equal to their diameter; cheeks very narrow, subcarinate posteriorly, becoming still narrower below; labrum nearly as broad as the median length, deeply grooved at apex between a pair of carinae, ending in pronounced tubercles; inner margin of mandible with a distinct, median angle; posterior margin of scutellum broadly and vaguely impressed medially, axillae robust, united with lateral margins of scutellum for nearly their entire length, lateral margins carinate and slightly thickened, tips not exceeding posterior margin of scutellum (fig. 110); wings with the usual three submarginal cells, lightly infuscated, veins brownish-testaceous; face with very fine, pale tomentum below, becoming somewhat more elongate and erect above, quite dense between antennal fossae and margin of eyes; pronotum densely yellow tomentose and tubercles with a marginal fringe of yellow tomentum; scutum with a pair of narrow, longitudinal lines of yellow tomentum anteriorly; metanotum and adjacent border of scutellum densely yellow tomentose, and lateral areas of propodeum above densely tomentose; abdominal tergum 1 densely yellow tomentose basally, this continuous laterally with a transverse, subapical, yellow tomentose fascia which is slightly interrupted medially and slightly removed from margin toward the mid-line, the resulting black patch broad, transverse, slightly narrowed at each extreme side; terga 2-4 with transverse, yellow fasciae which are entire, slightly narrowed medially on 2, and slightly removed from apical rims on 2 and 3, tergum 5 with a patch of yellow tomentum on each side of pseudopygidium; punctures close, deep and rather coarse on upper part of face, vertex and cheeks, becoming very fine and quite densely crowded on clypeus and lower portions of face below antennae; tegulae closely, deeply and rather finely punctate throughout; scutum, scutellum and axillae rather coarsely rugose, pleura more finely rugoso-punctate above, lower half with definite shining interspaces between the more distinctly separated punctures; discs of abdominal terga quite deeply, finely and closely punctate, the punctures quite uniform, to a considerable degree obscured by dark, appressed tomentum, finer and more densely crowded on tergum 5; pseudopygidium rather extensive, median length about half the apical width.

MALE—Answers quite fully to description of female, but front of face more densely pale tomentose, upper part of pleura quite densely covered with cream-colored tomentum, venter densely covered with silvery tomentum, the femora and hind tibiae darker; pygidium slightly broader at base than the median length, broadly rounded apically, margin carinate, surface rather closely and shallowly pitted.

DISTRIBUTION—Minnesota to Maine, south to North Carolina; September and October.

FLOWER RECORDS—*Aster* and *Haplopappus*. Robertson (1929) records this species on *Bidens*, *Helianthus*, *Rudbeckia* and *Solidago*.

Epeolus banksi (Cockerell)
new combination
(Fig. 110)

Triepeolus banksi Cockerell, 1907. Entomologist 40, p. 135. ♂.

FEMALE—Length 7-10 mm.; black, mandibles ferruginous, tegulae more or less testaceous with dark infusions, tarsi and spurs testaceous, the more basal segments of legs dark; segments of antennal flagellum slightly longer than broad, antennae entirely blackish; lateral ocelli separated from margin of vertex by a space about equal to their diameter; cheeks about half width of eyes, slightly narrowed below, posterior margin subcarinate; median length of labrum considerably greater than half the breadth, with a pair of small, acute, apical denticles; inner margin of mandibles with a distinct, submedian angle or tooth; scutellum outcurved posteriorly, with a very slight median impression, axillae rather broadly united to lateral margins, tips only

slightly protuberant, reaching very slightly beyond mid transverse line of scutellum (fig. 110); wings with the usual three submarginal cells, sub-hyaline basally, becoming lightly infuscated apically, veins brownish-testaceous; face with some quite dense, silvery tomentum around bases of antennae and lower part of face and clypeus, cheeks with some rather short but dense tomentum which does not hide the surface, upper part of face largely bare or with thin erect hairs; venter of thorax with some rather thin, pale tomentum which does not completely hide surface, pleura below largely bare, becoming quite densely tomentose above; margin of pronotum densely whitish tomentose, this continuing as a marginal fringe around tubercles, scutum with a pair of anterior, longitudinal and rather indefinite lines or patches of whitish tomentum on each side of mid-line, and some whitish tomentum at each extreme side anteriorly, the scutello-mesothoracic suture very finely and obscurely whitish tomentose; metanotum and adjacent areas of scutellum densely white tomentose; posterior face of propodeum rather densely white tomentose on each side of median triangle; anterior face of basal abdominal tergum densely white tomentose, apical margin with a dense and rather broad, transverse fascia which is rather widely interrupted medially, produced toward the base at least at each extreme side, but not quite attaining the more basal tomentose area, the resulting black patch more or less quadrangular, very wide, rather densely covered with very fine black tomentum; terga 2-4 with apical, transverse, fasciae which are slightly removed from rims and more or less widely interrupted medially, less so on tergum 4, slightly constricted at each side but broadened to lateral margins; tergum 5 with a broad, latero-apical patch of pale tomentum on each side, these widely separated medially; vertex and upper part of face densely and rather coarsely rugoso-punctate, with no shining interspaces evident, cheeks somewhat more finely rugoso-punctate, the clypeus and lower portions of face with very fine, densely crowded punctures; scutum closely and rather coarsely rugoso-punctate, the punctures somewhat more distinct on each side anteriorly, very densely crowded toward posterior margin, those on scutellum and axillae slightly coarser but densely crowded; punctures of pleura below rather coarse and deep, but slightly separated, with rather narrow shining interspaces evident, becoming densely crowded in tomentose area above; abdominal terga with very fine and close punctures beneath black tomentum, these becoming extremely fine and close on tergum 5; punctures of tegulae deep, distinct, quite close and very fine; pseudopygidium transverse, very broadly subtriangular, its median length equal to about one-third the apical width.

MALE—Agrees with description of female in general but segments of flagellum somewhat shorter; front of face with somewhat more copious silvery tomentum; punctures of pleura below somewhat closer, subcontiguous; tomentose area of venter and pleura more extensive; tergum 5 with a transverse, apical, whitish fascia which is slightly interrupted medially; tergum 6 with a narrow apical fascia; pygidial plate rather broadly rounded, median length about equal to basal width, margin carinate, surface rather closely but shallowly punctate.

DISTRIBUTION — Minnesota to New Jersey and North Carolina; April to October.

FLOWER RECORD—*Fragaria.*

Epeolus bifasciatus Cresson
(Fig. 110)

Epeolus bifasciatus Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 38. ♂.

Epeolus bifasciatus Robertson, 1903. Canad. Ent. 33, pp. 287, 288. ♀ ♂ (key).

Epeolus bifasciatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 7-8 mm.; black, basal segments of antennae testaceous, segments 2 and beyond of flagellum more brownish-piceous; mandibles and labrum more reddish; legs testaceous, hind spurs piceous, mid spurs somewhat darker, the front spurs pale testaceous; pronotum, tubercles, tegulae, scutellum and axillae reddish-testaceous, and disc of basal abdominal tergum more or less red beneath the tomentum; lateral ocelli separated from margin of vertex by a space somewhat greater than their diameter; cheeks very narrow, hind margin carinate, strongly narrowed below; median length of labrum slightly less than basal width, apical tubercles very low and inconspicuous; inner margin of mandibles with a very low and inconspicuous, submedian angle; scutellum rather evenly rounded posteriorly, axillae robust, tips rather strongly divergent from sides of scutellum, lateral margins subcarinate (fig. 110); wings with the usual three submarginal cells, quite deeply infuscated, veins brownish-piceous; pubescence in general very short and inconspicuous, venter of thorax with a small amount of dense, white tomentum along mid-line; pronotum densely covered with bright yellow, appressed

tomentum; disc of basal abdominal tergum largely covered with dense yellow tomentum, and tergum 2 yellow tomentose across the apical impressed area, the more apical terga not fasciate; a dense, transverse band of cream-colored tomentum on metanotum just below scutellum; punctures quite fine and close but deep and quite distinct on head, densely crowded between lateral ocelli and top of each eye, but with a conspicuous, impunctate elevation just below this, adjacent to eye margin; pleural punctures very coarse, deep and well separated or sparse below, becoming quite close above, those on scutum quite regularly distributed, coarse and close, becoming somewhat coarser posteriorly, those on scutellum very coarse but rather shallow, as those on axillae; punctures of abdominal terga rather fine but very close, deep and distinct, becoming somewhat finer on impressed, apical areas, tegulae with very fine, close punctures along inner side, these disappearing toward outer margin; pseudopygidium very short but quite broad across apical margin of tergum 5.

MALE—Resembles female in all respects other than the sexual differences. The pygidium is rather broadly sub-truncate, quite coarsely and closely punctate, the margin carinate.

DISTRIBUTION — Northern Mexico, Colorado and Minnesota, to the New England states and Florida; February to April in Florida, June to September in the North.

FLOWER RECORDS — *Asclepias, Cirsium, Coreopsis, Erigeron, Helianthus, Melilotus, Nepeta, Rudbeckia* and *Vernonia.* Robertson (1929) records *bifasciatus* also on *Aster, Bidens, Boltonia, Dianthera, Eryngium, Eupatorium, Heliopsis, Lepachys, Lythrum, Petalostemum, Pycnanthemum, Solidago, Trifolium, Verbena* and *Verbesina.*

HOST—Probably *Colletes latitarsis.*

Epeolus canadensis new species
(Fig. 110)

FEMALE—Length 9 mm.; black, basal segments of antennae, mandibles, tubercles, tegulae, tibiae and tarsi brownish-testaceous, spurs yellow and femora dark, segments of flagellum beyond segment 1 slightly longer than broad, piceous in color; space separating lateral ocelli from margin of vertex about equal to their diameter; cheeks about half width of eyes, posterior margin sub-carinate, rather strongly narrowed below; median length of labrum somewhat greater than half the breadth, tip excavated medially between a pair of apical denticles; inner margin of mandible with a distinct, subapical tooth; scutellum somewhat outcurved, rather deeply impressed medially (fig. 110); axillae joined quite broadly to sides of scutellum, tips only slightly protuberant, reaching a point slightly beyond its mid transverse line; wings with the usual three submarginal cells, lightly infuscated, somewhat darker in region of marginal cell and apex, veins brownish-testaceous; face rather densely whitish tomentose around bases of antennae and toward eyes, hairs on upper part of face and vertex more elongate and erect, cheeks with very short, sparse, white pubescence; venter of thorax rather densely white tomentose, pleura below bare but becoming quite densely pale tomentose above, margin of pronotum densely pale tomentose, and tubercles with a fringe of the same color; scutum with a semicircular patch of pale tomentum enclosing a median, anterior triangular area which is more finely and densely rugoso-punctate than remainder of disc, the scutello-mesothoracic suture with a conspicuous fringe of yellowish tomentum; metanotum densely tomentose on each side, rather widely interrupted medially, and corresponding surfaces of scutellum above also tomentose; anterior face of basal, abdominal tergum densely pale yellowish tomentose, this broadly continuous with an apical, tomentose fascia, the resulting black tomentose patch triangular in form, apical band rather widely interrupted medially; terga 2-4 with apical, yellow, tomentose fasciae slightly separated from apical rims which are yellowish-hyaline, the fascia slightly interrupted on 2, discs covered with extremely short, black tomentum, tergum 5 with a transverse, broad, tomentose band which encloses the pseudopygidium; punctures coarse, deep, distinct and quite close on upper part of face just below ocelli, becoming finely and densely rugose back of ocelli and eyes, cheeks with more distinct but very close and deep punctures, lower portion of face and clypeus very finely and closely punctate; scutum rather coarsely rugoso-punctate, axillae with similar close punctures, those on scutellum somewhat more coarse and distinct; lower half of pleura with rather irregular but distinct punctures, with a few shining interspaces evident, becoming densely rugose over upper half; abdominal terga with very fine, close, evenly distributed punctures obscured by black tomentum, these becoming still finer and densely crowded on the more apical terga; pseudopygidium transverse, very short, median length less than half

the apical width; tegulae uniformly, closely, very finely and deeply punctate.

MALE—Agrees generally with description of female, but front of face more densely silvery tomentose; segments of flagellum no longer than broad, somewhat redder in color; silvery tomentum of venter of thorax somewhat more extensive; and pygidial plate somewhat broader than its median length, the margin carinate, and surface very shallowly punctate.

TYPES — Holotype: Female, Ingonish, Cape Breton Island, Nova Scotia, Aug. 7, 1928 [M.C.Z.]. Allotype: 9-Mile Creek, Ithaca, N. Y., July 10, 1937 (P. P. Babiy) [Cornell Univ.]. Paratypes: 1 ♂, Goderich, Ont., June 28, 1906; 1 ♀, St. Annes, Que., July 21, 1931; 1 ♀, Cheboygan Co., Douglas Lake, Mich., Aug. 1928; 1 ♀, Clark Co., Ind., State Forest, Aug. 12, 1950.

Paratypes are in collections of the U. S. National Museum, Purdue University, the University of Michigan and T. H. Hubbell.

Epeolus carolinus new species
(Fig. 110)

FEMALE—Length 7-8 mm.; black, basal segments of antennae, mandibles,, and legs in large part, tubercles, tegulae and margin of pronotum, testaceous; mid and hind spurs more piceous; scutellum and axillae more ferruginous; lateral ocelli separated from margin of vertex by about their own diameter; segments of flagellum quite elongate, breadth of median segments only slightly more than half the length, brownish-piceous; cheeks about half width of eyes, somewhat narrower below, hind margin subcarinate; median length of labrum somewhat more than half the breadth, with a pair of low but distinct, subapical denticles; mandibles very slender, with a barely perceptible, submedian angle on inner margin; posterior margin of scutellum nearly straight, not noticeably impressed (fig. 110); axillae strongly divergent from lateral margins of scutellum, acute apically, strongly carinate laterally, resulting in a distinct lateral surface that is more or less compressed; wings with the usual three submarginal cells, rather deeply infuscated, veins brownish-piceous; face around antennae rather densely silvery tomentose, and venter of thorax with considerable silvery tomentum, this fading out on lateral surfaces of pleura; margin of pronotum quite densely yellow tomentose, and tubercles fringed with short yellow tomentum; metanotum yellow tomentose beneath the rather strongly over-hanging scutellum; abdominal terga 1-4 with transverse, dense, yellow tomentose fasciae, these more or less interrupted medially, quite broad on tergum 1, becoming successively narrower on 2, 3 and 4, tergum 5 with an area on each side of thin whitish and rather obscure tomentum; vertex, cheeks and upper part of face quite closely and rather coarsely rugoso-punctate, becoming very densely and minutely punctate below; pleura rather coarsely rugoso-punctate below, with some irregular, narrow, shining spaces evident, becoming densely rugose above; scutum rather coarsely and densely rugose, scutellum more coarsely rugoso-punctate, with no intervening spaces evident; tegulae very finely and closely but quite distinctly punctate throughout; abdominal terga with very fine and close, uniformly distributed punctures, these becoming slightly more minute and crowded on the more apical terga; pseudopygidium very short and obscure, median length but a fraction of the apical width.

MALE—Answers to description of female in general, but segments of antennal flagellum scarcely longer than broad, venter of thorax more densely silvery tomentose, and pleura with a thin covering of whitish, plumose hairs; scutellum and axillae often black; pygidial plate rather narrow, narrowly rounded apically, median length somewhat greater than basal width, margin carinate, surface very shallowly and obscurely punctate.

TYPES — Holotype: Male, Kill Devil Hills, Dare Co., N. C., Sept. 12, 1956 (Mitchell, on *Eupatorium)* [author's coll.]. Allotype: New River, N. C., Sept. 20-30, 1944 (G. E. Bohart). Paratypes: 3 ♂♂, 3 ♀♀, New River, N. C., Sept. 20-30, 1944 (Bohart); 13 ♂♂, Kill Devil Hills, N. C., Sept. 12 & 13, 1956 (Mitchell, on *Eupatorium);* 5 ♂♂, Kill Devil Hills, N. C., Sept. 8-14, 1956 (Krombein); 1 ♀, Gainesville, Fla., 11-6-46 (H. V. Weems, Jr.).

Paratypes are in collections of the U. S. National Museum, G. E. Bohart, the State Plant Board of Florida and the author.

Epeolus erigeronis new species
(Fig. 110)

FEMALE—Length 8-9 mm.; black, legs and tegulae testaceous, spurs yellow, tubercles more or less testaceous, mandibles more ferruginous except at tip, and basal segment of flagellum, along with base and apex of the scape, brownish-testaceous, flagellum otherwise more piceous; lateral ocelli separated from margin of vertex by about their own di-

ameter, cheeks about half width of eyes, posterior margin carinate; median length of labrum somewhat greater than half the width, more or less ferruginous, with a pair of obscure, subapical tubercles; inner margin of mandible nearly entire, without a distinct angle or tooth; posterior margin of scutellum nearly straight, not evidently grooved medially (fig. 110); axillae strongly divergent from sides of scutellum, the acute tips reaching about to its mid transverse line, lateral margins obscurely carinate, with a resulting, quite distinct, lateral surface which is rather narrow; wings with the usual three submarginal cells, sub-hyaline basally, becoming rather deeply infuscated apically, veins brownish-piceous; face around and below antennae rather densely white tomentose, cheeks somewhat more thinly so, and vertex entirely exposed, with only very fine, suberect hairs; venter of thorax rather thinly white tomentose, not obscuring surface, pleura below exposed, becoming rather densely tomentose above; margin of pronotum rather thinly white tomentose, and tubercles with a marginal fringe; scutum with a pair of obscure, anterior, longitudinal lines on each side of midline, and scutellomesothoracic suture thinly tomentose; metanotum densely white tomentose beneath the thinly tomentose, slightly overhanging scutellum; posterior face of propodeum densely white tomentose at each extreme side; anterior face of basal abdominal tergum densely white tomentose, this narrowly continuous with an apical tomentose fascia which is narrowly interrupted medially and slightly removed from apical rim, the resulting black patch transverse, very wide, the black tomentose hairs very short and inconspicuous; terga 2-4 with apical, whitish, tomentose fasciae, this slightly interrupted on 2, and lateral portion of disc on tergum 2 with a white tomentose patch, tergum 5 with a thinly white tomentose area on each side; tegulae very closely, finely, deeply and regularly punctate throughout; punctures of vertex, cheeks and upper part of face quite deep and distinct, close along vertex, back of eyes and ocelli, becoming somewhat more distinctly separated below, but very minute and densely crowded below antennae; scutum quite coarsely rugosopunctate, with some very narrow, indefinite, shining interspaces; scutellum and axillae much more coarsely reticulate; pleura coarsely reticulate below, becoming somewhat more finely and densely rugose above; punctures of abdominal terga very fine, uniform, rather close but not contiguous on the more basal terga, becoming more minute and almost crowded on the more apical terga; pseudopygidium quite extensive, median length considerably greater than half the width.

MALE—Agrees in general with description of female, but wing veins are more yellowish and venter of the thorax is more densely silvery tomentose; pygidial plate somewhat longer than basal width, rather narrowly rounded, margin carinate, surface rather smooth, with scattered, suberect hairs.

TYPES—Holotype: Female, Levy Co., Fla., Apr. 13, 1955. Allotype: topotypical (both H. V. Weems, Jr., on *Erigeron quercifolius)*. Paratypes: FLORIDA: 3 ♀♀, topotypical; 1 ♀, Alachua Co., Apr. 15, 1955 (on *Melilotus alba)*; 2 ♀♀, Marion Co., Apr. 6, 1956 (on *Erigeron quercifolius);* 1 ♂, Osceola National Forest, Columbia Co., Apr. 19, 1954 (all H. V. Weems, Jr.); 1 ♂, Baker Co., May 27, 1937 (O. D. Link); 1 ♂, Olga, Mar. 30, 1954 (K. V. Krombein, on sand flats); 1 ♀, Highlands Hammock State Park, Apr. 7, 1955 (Mitchell); 1 ♀, LaBelle, Apr. 18 (J. N. Knull). GEORGIA: 1 ♂, 2 ♀♀, Billy's Island, Okefenokee Swamp, June 1912; 1 ♀, Fort Gordon, Richmond Co., June 8, 1958 (R. R. Snelling). NORTH CAROLINA: 1 ♀, Southport, June 24, 1928 (Mitchell, on *Hypericum*); 1 ♂, Wake Co., June 16, 1955 (H. V. Weems, Jr.); 1 ♂, Highlands, Macon Co., July 23. 1955 (Mitchell).

Paratypes are in collections of the State Plant Board of Florida, the U. S. National Museum, Cornell University, R. R. Snelling and the author.

Epeolus floridensis new species

(Fig. 110)

FEMALE—Length 8 mm.; head chiefly black, antennae pale testaceous, labrum and mandibles more ferruginous, and clypeus somewhat infused with ferruginous; thorax ferruginous in large part, but venter blackened and propodeum entirely black; basal abdominal tergum ferruginous, following terga largely black, but more or less reddish-hyaline along apical margins; space separating lateral ocelli from margin of vertex considerably less than their diameter; cheeks extremely narrow, posterior margin subcarinate; median length of labrum only slightly less than basal width, subapical denticles small but quite distinct; mandibles simple, inner margin nearly straight; posterior margin of scutellum nearly straight, axillae robust, tips acute and extended considerably beyond margin of scutellum (fig. 110); wings with the usual three submarginal cells, subhyaline, faintly clouded apically, veins piceous; cheeks

and face around and below antennae densely silvery tomentose; venter of thorax quite densely tomentose, this becoming rather thin on pleura above, pronotum with a narrow but quite dense covering of white tomentum, scutum with a pair of narrow, anterior, longitudinal lines of white tomentum on each side of midline, and metanotum densely white tomentose below scutellum; basal abdominal tergum with a basal, densely white tomentose area, and terga 1-4 with dense, white, apical, tomentose fasciae which are rather widely interrupted medially, these slightly separated from hind margin of terga toward midline, tergum 5 with an area of rather thin white tomentum on each side; punctures quite deep and distinct but rather close in general, coarse and rather close on upper part of face, becoming minute and densely crowded below antennae, slightly separated on pleura below, becoming more or less crowded above, close and rather coarse over most of scutum, becoming crowded posteriorly and crowded on scutellum and axillae; tegulae minutely and very closely punctate; punctures fine and rather close and evenly distributed on discs of the more basal abdominal terga, becoming finer on the slightly depressed apical margins, but extending nearly to the yellowish rims, minute and close over most of tergum 5; pseudopygidium quite small and narrow, median length almost equal to apical width.

MALE—This sex agrees in most respects with descrition of female, but front of the face is more densely silvery tomentose, and usually there is a shining impunctate area near top of each eye on inner margin; pygidial plate rather broadly rounded, margin carinate, surface very obscurely and shallowly punctate.

TYPES — Holotype: Female, Arcadia, Desoto Co., Fla., Apr. 27, 1955. Allotype: topotypical (both M. A. & H. E. Evans) [Cornell University]. Paratypes: FLORIDA: 5 ♀♀, 4 ♂♂, topotypical; 1 ♀, 4 ♂♂, Levy Co., July 13, 1954 (H. V. Weems, Jr., on *Eriogonum tomentosum*). [Fla. Plant Board].

Epeolus glabratus Cresson
(Fig. 110)

Epeolus glabratus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 90. ♂.

FEMALE—Length 8 mm.; black, antennae and legs testaceous, labrum, mandibles, pronotum, tubercles, tegulae, scutellum, axillae, and discs of abdominal terga 1 and 2 more ferruginous; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, less than half width of eyes, hind margin subcarinate; median length of labrum subequal to breadth, with a pair of small, subapical denticles; inner margin of mandibles nearly straight, neither dentate nor angulate; posterior margin of scutellum slightly impressed medially (fig. 110); axillae acute, strongly divergent from sides of scutellum apically, lateral surface separated from dorsal surface by a distinct carina; wings with the usual three submarginal cells, strongly infuscated, veins piceous; pubescence in general very short and inconspicuous, subappressed, rather dense between antennae and eyes, and back of wing bases; thoracic sternum densely white tomentose; punctures coarse, deep and irregular over most of head and thorax, becoming very fine and close on face below antennae, well separated across upper part of face just below ocelli, rather fine and close on cheeks, fine and densely crowded on pronotum, coarse and well separated on pleura, but becoming somewhat more finely rugose just below wing bases; tegulae very finely and rather closely punctate; scutum with a pair of anterior, longitudinal, shallow grooves on each side of midline, the punctures between these somewhat finer than on each side where they are somewhat more widely or definitely separated, becoming quite close across posterior margin, those on scutellum somewhat coarser and very close; punctures on ferruginous discs of abdominal terga 1 and 2 deep, distinct and well separated but not sparse, the depressed apical margins blackened and very minutely and closely punctate, the punctures obscured by fine, dense and dark, appressed tomentum, punctures of the more apical terga finer and closer; pseudopygidium quite extensive, median length nearly equalling apical width.

MALE—This agrees with the female in most characters, but mandibles are slightly angulate on inner margin. The pygidium is rather broadly rounded, median length about equal to basal width, with a distinct marginal carina.

DISTRIBUTION—Georgia and Florida; March to July.

FLOWER RECORD—*Vicia*.

Epeolus howardi new species
(Fig. 110)

FEMALE—Length 9 mm.; black, antennal bases, labrum, mandibles, legs and tegulae testaceous, flagella somewhat more brownish, mid and hind spurs somewhat darker; upper half of pleura, lateral margins of scutum, and

entire scutellum and axillae more ferruginous; lateral ocelli nearly contiguous with margin of vertex; cheeks extremely narrow, eyes in lateral view being four or five times as broad; labrum nearly twice as broad as the median length, shallowly grooved medially toward apex, with a pair of very minute, apical denticles on each side of this groove; inner margin of mandibles with a very slight median angle; posterior margin of scutellum straight, much exceeded by the extensive, triangular axillae (fig. 110); wings with the usual three submarginal cells, subhyaline basally, becoming lightly infuscated apically, veins piceous; face around base of antennae and venter of thorax densely silvery tomentose, cheeks rather densely covered with very short pale tomentum; margin of pronotum and tubercles, a pair of narrow, longitudinal, anterior lines on scutum, and metanotum, densely yellow tomentose, the lateral margins of posterior face of propodeum quite densely tomentose, with upper portion of pleura very thinly yellow tomentose; abdominal terga 1-4 with dense, yellow, apical, tomentose fasciae, these slightly interrupted at midline and slightly broader toward this interruption on 2-4, basal tergum yellow tomentose across base, median black patch of disc reaching very nearly to each extreme side, tergum 5 with a small patch of more silvery tomentum on each side of pseudopygidium; tegulae very minutely and quite closely punctate over median and posterior portions; face below ocelli shining, punctures distinctly separated and rather coarse and deep across median area, becoming sparse at margins of eyes, lower part of face and cheeks becoming very minutely and closely punctate; scutum rather finely and densely rugoso-punctate medially and across posterior half, punctures more distinct on each side anteriorly; scutellum and axillae somewhat more coarsely rugoso-punctate; pleura below with distinctly but not widely separated punctures, interspaces somewhat wider than diameter of punctures, becoming close on pleura above; punctures of abdominal terga minute and rather close, somewhat obscured by very short, dark and rather inconspicuous tomentum, punctures of the more apical segments more distinct but minute and very close; pseudopygidium rather narrow, median length nearly equal to apical width.

MALE—This answers in general to description of female, but front of face is more densely silvery tomentose, with lateral areas just below ocelli, adjacent to eyes, shining, impunctate and slightly swollen, punctures limited to the rather narrow, median area; tomentum of pleura somewhat more dense, obscuring surface; pygidium sub-triangular, with rather broadly rounded apex, margin carinate, surface quite smooth, with some very fine, suberect hairs.

TYPES — Holotype: Female, Southern Pines, N. C., Sept. 30, 1951. Allotype: topotypical, Sept. 15, 1949 (on *Kuhnistera pinnata*) (both Mitchell).

HOST — It is suspected that *Colletes howardi* is the host of this species.

Epeolus ilicis new species
(Fig. 110)

FEMALE—Length 8-9 mm.; black, basal segments of antennae, legs, tegulae and tubercles testaceous; segments of flagellum beyond the first more brownish, mandibles reddish-testaceous, axillae ferruginous, and spurs yellowish-ferruginous; lateral ocelli separated from margin of vertex by a space about equal to their diameter; cheeks about half width of eyes, posterior margin sub-carinate; median length of labrum slightly more than half the basal width, with an obscure, subapical pair of denticles; inner margin of mandibles entire, neither dentate nor angulate; posterior margin of scutellum nearly straight, with a very narrow and obscure median impression (fig. 110); axillae rather small, widely divergent from sides of scutellum, tips barely reaching a line drawn through basal third of scutellum; wings with the usual three submarginal cells, subhyaline basally, becoming faintly clouded apically, veins pale testaceous to brownish; face with some dense, pale tomentum around bases of antennae and along sides of face, the clypeus, vertex and upper part of face largely exposed, cheeks rather thinly tomentose; venter of thorax rather thinly white tomentose, pleura below nearly bare, becoming rather densely tomentose over upper half, margin of pronotum narrowly pale yellowish tomentose, the fringe continuous around tubercles; scutum with a pair of narrow, longitudinal lines of yellowish tomentum on each side of midline anteriorly and a narrow fringe of the same color at each extreme side and across the scutello-mesothoracic suture; metanotum densely white tomentose beneath the somewhat overhanging scutellum and reaching the extreme lateral margins of posterior face of propodeum; basal abdominal tergum with a triangular, tomentose area on each side toward the anterior face, which is continuous with a transverse, apical, whitish fascia which is slightly interrupted medially, the resulting black patch very broad, strongly narrowed toward each extreme side; terga 2-4 with apical tomentose fasciae, that on 2 slightly interrupted medially, and 5 with a limited area of pale tomentum on each side

of pseudopygidium; punctures of vertex, cheeks and upper part of face quite deep and distinct, rather close except for the area just below ocelli, becoming very fine and densely crowded below antennae and over clypeus; pleura below rather coarsely rugoso-punctate, with some shining but narrow intervening spaces evident, upper part very densely and rather finely rugose; scutum rather finely rugose throughout, somewhat more coarsely so toward anterior margin, scutellum somewhat more coarsely and densely rugose, axillae very finely so; punctures of discs of abdominal terga very fine, evenly distributed, rather close but not crowded on the more basal terga, becoming progressively finer and closer to tergum 5; median length of pseudopygidium much greater than half the apical width.

MALE—This sex agrees in general with description of female, but antennae darker, quite black at base, and axillae black, with femora and coxae of hind legs dark; scutum somewhat more distinctly but still very closely punctate; pygidial plate as broad as the median length, rather narrowly rounded apically, margin carinate, surface rather smooth, with only very obscure, minute punctures and suberect, short pubescence.

TYPES—Holotype: Female, Holly Shelter, Pender Co., N. C., May 30, 1950 (T. B. Mitchell, on *Ilex glabra*). Allotype: topotypical [both author's coll.]. Paratypes: NORTH CAROLINA: 2 ♀♀, topotypical; 3 ♀♀, Holly Shelter, June 8, 1950 (1 ♀ on *Amorpha*); 1 ♂, Whiteside Mt., Macon Co., June 11, 1937; 1 ♀, Southern Pines, May 12, 1950; 1 ♀, Wayne Co., May 23, 1950 (on *Batodendron*); 1 ♀, Wake Co., June 16, 1955 (on *Rhus glabra*); 1 ♀, Carolina Beach, New Hanover Co., May 19, 1934 (all Mitchell); 1 ♀, Candler, July 15, 1938 (D. L. Wray). GEORGIA: 2 ♀♀, Indian Grave Gap, July 11, 1951 (P. W. Fattig); 1 ♀, 2 ♂♂, Fort Gordan, May 8, 1958 and Apr. 25, 1959 (R. R. Snelling). TENNESSEE: 1 ♀, Pine Heath, Gatlinburg, GSMNP, 3500 ft., July 8, 1947 (R. H. Whittaker, sweeping). SOUTH CAROLINA: 1 ♀, Dewees Is., May 29 (J. Bequaert); 3 ♂♂, McClellanville, May 10, 12 & 19 (H. & G. Townes). RHODE ISLAND: 1 ♂, Kingston, June 29, 1921. MASSACHUSETTS: 1 ♀, Sagamore (J. Bequaert). NEW YORK: 1 ♀, Orient, L. I., June 1, 1952 (Roy Latham).

Paratypes are in collections of the U. S. National Museum, the Museum of Comparative Zoology, R. R. Snelling, the North Carolina Department of Agriculture, the University of Rhode Island and the author.

Epeolus interruptus Robertson

(Figs. 109 & 110)

Epeolus interruptus Robertson, 1900. Acad. Sci. St. Louis. Trans. 10, p. 55. ♀.

Epeolus interruptus Robertson, 1903. Canad. Ent. 33, pp. 287, 288, ♀ ♂ (key).

Epeolus interruptus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8 mm.; black, basal segments of antennae, mandibles, tubercles, tegulae, and legs, in large part testaceous; segments of flagellum beyond the first slightly longer than broad, more brownish below, piceous above; lateral ocelli separated from margin of vertex by a space slightly greater than their diameter; cheeks about half width of eyes, posterior margin obscurely carinate below, rounded above; median length of labrum about half the breadth, with a pair of very minute, apical denticles, with a low submedian transverse ridge which is slightly interrupted medially; inner margin of mandible with a distinct, subapical angle or tooth; scutellum somewhat outcurved, with a rather deep median impression, axillae broadly united to lateral margins, only very slightly protuberant, tips hardly reaching mid transverse line of scutellum (fig. 110); wings with the usual three submarginal cells, lightly infuscated, veins brownish-testaceous; face with some dense, whitish tomentum around bases of antennae, but clypeus and other areas of head largely bare; venter of thorax with some dense, white tomentum, but lateral surfaces of pleura largely bare below, upper part quite densely whitish tomentose; margin of pronotum quite densely pale yellowish tomentose, continuing as a fringe of short hairs around tubercles; scutum with a pair of very narrow, longitudinal lines of yellowish tomentum on each side of mid-line anteriorly, the scutellomesothracic suture very narrowly yellowish tomentose; metanotum with a rather dense tuft of pale tomentum near mid-line, bare on each side, adjacent margin of scutellum narrowly whitish fasciate from one extreme side to the other, lateral, dorsal areas of posterior face of propodeum with a dense, whitish tomentose patch; anterior face of basal abdominal tergum with a triangular, yellowish, tomentose patch on each side, this distinctly separated from an apical tomentose fascia which is rather widely interrupted medially and quite strongly constricted on each side, becoming broadened laterally, the resulting

dark patch more or less triangular, covered with thin but dense black tomentum; terga 2-4 with apical tomentose fasciae which are interrupted medially, slightly constricted on each side and broadened again toward extreme lateral margins, slightly separated from rims; tergum 5 with a rather large patch of whitish tomentum on each side toward apical margin; punctures of head deep and distinct, rather close in general but somewhat separated and rather coarse below antennae toward eyes, becoming closer on vertex and cheeks, fine and distinct on clypeus, more minute on lateral areas of face below; scutum and scutellum rather uniformly densely rugoso-punctate throughout, punctures of axillae somewhat more coarse and distinct; pleura very densely rugose above, with rather coarse punctures over lower half which are to some degree separated, interspaces shining; discs of abdominal terga very finely, closely and uniformly punctate throughout; tegulae very finely, closely and distinctly punctate anteriorly, punctures becoming more minute and obscure posteriorly; pseudopygidium transverse and extremely short, barely evident.

MALE—Agrees with description of female in general, but segments of flagellum slightly broader than long, tegulae more fully punctate posteriorly, thoracic punctures in general somewhat coarser; pygidial plate about as long as basal width, marginal carina distinct, broadly rounded apically, surface with rather obscure but close punctures, bearing suberect, short hairs.

DISTRIBUTION — Texas, Illinois and Michigan to Georgia and New Jersey; April to July.

FLOWER RECORDS—*Chrysanthemum* and *Trifolium*. Recorded by Robertson (1929) on *Coreopsis, Krigia, Psoralea* and *Rudbeckia*.

Epeolus lanhami new species
(Fig. 110)

FEMALE—Length 7-9 mm.; black, mandibles ferruginous except for the darkened base and apex, tegulae bright testaceous, tarsi brownish-testaceous, tibiae testaceous, with varying amounts of black infusion, spurs piceous to black and femora black; lateral ocelli separated from margin of vertex by about their own diameter; cheeks about half width of eyes, posterior margin obscurely carinate below, but more rounded above; median length of labrum about half the breadth, with a pair of rather obscure, subapical denticles; inner margin of mandible with a distinct subapical tooth; scutellum rather strongly outcurved, broadly impressed medially, axillae broadly united to sides of scutellum, but very short, tips only very slightly protuberant, not attaining mid transverse line of scutellum (fig. 110); wings with but two submarginal cells, second receiving both recurrent veins, subhyaline basally, becoming very lightly infuscated apically, veins brownish-testaceous; pubescence greyish-white, very thin and inconspicuous over most of head; margin of pronotum rather densely tomentose on each side, marginal fringe of tubercles extremely short and inconspicuous; scutum with a pair of longitudinal, narrow lines of pale tomentum anteriorly on each side of midline, and antero-lateral angles of plate rather densely

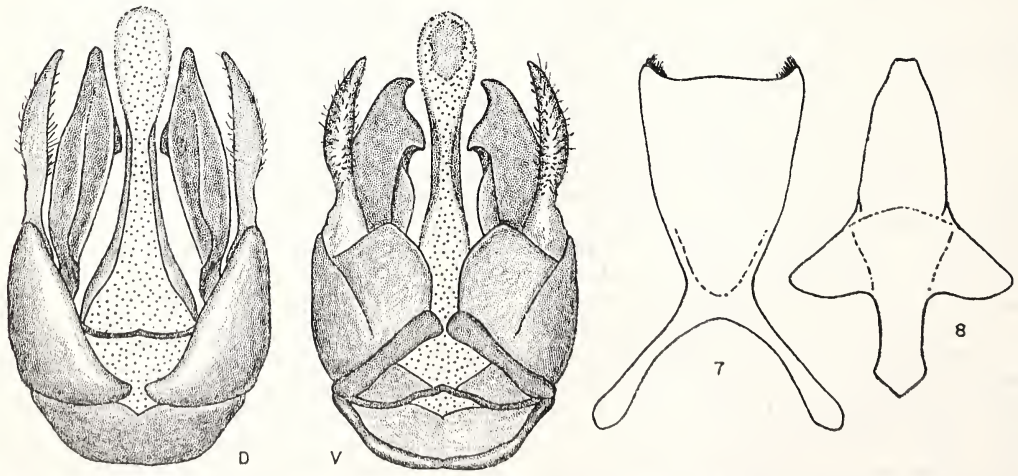


Figure 109—Sterna 7 and 8, and dorsal and ventral views of genital armature in male of *Epeolus interruptus*

pale tomentose, the scutello-mesothoracic suture with a thin pale fringe; metanotum nearly bare but adjacent margin of scutellum rather densely tomentose, especially on each side; pleura and venter of thorax nearly bare; basal abdominal tergum densely whitish tomentose across anterior face, broadly joining the apical fascia which is broadly interrupted medially, the resulting dark patch rather limited in area, thinly covered with dark tomentum; tergum 2 with an apical pale fascia which is interrupted medially and diverging from posterior rim; terga 3 and 4 with quite broad, apical fasciae which do not reach lateral margins and are slightly interrupted medially, each one more or less ovate in form, tergum 3 with a small, whitish patch on each extreme side that is separated from the fascia; tergum 5 without pale tomentum; punctures of tegulae deep and distinct, very close and fine throughout; punctures deep, distinct, close and rather coarse over vertex, cheeks and upper part of face, becoming very fine and close below antennae and over clypeus; scutum, scutellum and axillae quite deeply, distinctly, rather coarsely and very closely punctate throughout, punctures becoming contiguous laterally and posteriorly; punctures of lower portion of pleura deep, distinct, rather coarse, quite close, with only very narrow, shining interspaces at all evident, becoming densely crowded above; punctures of abdominal terga very fine, quite close, evenly distributed, becoming somewhat more crowded on the more apical terga; pseudopygidium transverse and very short.

MALE—Answers to description of female in general, but tegulae dark and tarsi more or less darkened; head without appressed tomentum, the pubescence thin but rather copious and erect; abdominal fasciae more nearly complete on terga 3 and 4, quite strongly narrowed toward each side but not interrupted, tergum 5 with a short, subapical fascia on each side of midline which does not continue to lateral margin; pygidial plate rather short, broadly rounded or subtruncate, the marginal carina obscure, surface somewhat convex and rather coarsely but shallowly punctate.

TYPES—Holotype: Female, near Saline, Mich., June 26, 1954. Allotype: topotypical (both U. N. Lanham). Paratypes: 1 ♂, Kalbaska Co., Mich., June 19, 1944; 1 ♀, Midland Co., Mich., June 24, 1944 (both R. R. Dreisbach); 1 ♀, Me. Agr. Exp. Sta., Oreno, Me., June 26, 1929; 1 ♀, Inglenook, Pa., June 27, 1923 (H. B. Kirk).

Paratypes are in collections of the U. S. National Museum and R. R. Dreisbach.

Epeolus lectoides Robertson
(Fig. 110)

Epeolus lectoides Robertson, 1901. Canad. Ent. 33, p. 231. ♀.
Epeolus lectoides Robertson, 1903. Canad. Ent. 35, pp. 287, 288. ♀ ♂ (key).
Epeolus semilectus Cockerell, 1907. Entomologist 40, p. 136. ♂. New synonymy.
Epeolus lectoides Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 8-10 mm.; black, scape and basal segment of flagellum more testaceous, antennae otherwise brownish-piceous; mandibles and tubercles more or less reddened, tegulae and legs testaceous, axillae sometimes reddened; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, subcarinate posteriorly; labrum considerably broader than median length, the subapical tubercles quite distinct; mandibles simple, inner margin not angulate; scutellum quite deeply impressed medially on posterior margin (fig. 110), axillae robust, acute, tips strongly divergent from sides of scutellum, subcarinate laterally; wings with the usual three submarginal cells, hyaline basally, becoming rather deeply infuscated apically, veins brownish; pubescence very short, either very thin or appressed, front of face densely silvery tomentose, and venter of thorax covered with dense, silvery tomentum, the scale-like hairs becoming sparse on pleura above; pronotum quite densely covered with pale yellowish tomentum, scutum with a pair of anterior, longitudinal patches of yellowish tomentum on each side of midline; abdominal terga 1-4 with transverse, subapical, pale yellowish fasciae that are narrowly interrupted medially, that on tergum 1 rather broad but quite narrow, somewhat separated from margin of plate on 2-4, 5 with a broad patch of dense, greyish tomentum on each side; punctures quite deep and distinct in general, rather sparse between ocelli and eyes and below ocelli, becoming fine and close on lower portion of face and on cheeks; punctures deep and distinct, quite sparse or well separated on pleura below, becoming rather close above, rather close along mid-line of scutum but becoming quite sparse on each side, scutum quite deeply impressed medially on posterior margin, punctures coarse and subcontiguous, those on axillae coarse and irregular; tegulae very finely and rather closely punctate; punctures of the more basal abdominal terga rather fine but quite deep and distinct, slightly separated in general, but variable, usually bearing very short, dark, plumose setae, apical margins of the terga

slightly and rather broadly depressed, becoming yellowish-hyaline along rims, punctures fading out apically, those on tergum 5 minute and very close; pseudopygidium quite extensive, median length much more than half its apical width.

MALE—Agrees in most respects with description of female, but pygidium broadly rounded, median length about equal to basal width, surface rather smooth and only very obscurely punctate.

DISTRIBUTION—Illinois to the New England states, south to Georgia; June to September.

FLOWER RECORDS—*Ceanothus, Cephalanthus, Helenium, Hypericum* and *Rhus.* Recorded by Robertson (1929) on *Pycnanthemum.*

Epeolus minimus (Robertson)

Triepeolus minimus Robertson, 1902. Ent. News 13, p. 81.
Argyroselenis minima Robertson, 1903. Canad. Ent. 35, p. 284.
Argyroselenis minimus Graenicher, 1906. Wis. Nat. Hist. Soc. Bul. 4, p. 138.
Argyroselenis minimus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press.

FEMALE—Length 8 mm.; black, mandibles except tips, mid and hind legs, tarsi, front tibiae in part, tubercles and tegulae, testaceous; antennal scape testaceous at apex, somewhat less so at base, dark medially, pedicel and basal segment of flagellum rather bright testaceous, following segments of flagellum slightly longer than broad, piceous to black; lateral ocelli separated from margin of vertex by somewhat less than their own diameter; cheeks about half width of eyes, not noticeably carinate posteriorly, somewhat narrowed below; median length of labrum somewhat more than half the breadth, with a pair of distinct, acute, apical tubercles, more or less testaceous apically, dark basally; inner margin of mandible with a more or less acute angle or tooth slightly beyond mid point; scutellum rather broadly outcurved, shallowly and rather narrowly impressed medially; axillae rather broadly joined to sides of scutellum, tips acute and only slightly protuberant, about attaining mid transverse line of scutellum (similar to *banksi*, fig. 110); wings with the usual three submarginal cells, hyaline basally, very faintly clouded apically, veins piceous; face and cheeks rather densely silvery tomentose, the vertex and upper part of face more thinly covered with longer, erect hairs; venter of thorax densely white tomentose, hiding the surface, pleura largely bare medially, densely pale tomentose above; margin of pronotum densely tomentose, and tubercles with a dense fringe; scutum with an elongate, longitudinal patch of pale tomentum anteriorly on each side of mid-line and a similar patch at each extreme side anteriorly, continuing narrowly around tegulae to posterior margin and more thinly across the scutello-mesothoracic suture; metanotum rather thinly pale tomentose, adjacent surface of scutellum above more extensively tomentose, and lateral surfaces of propodeum with much pale tomentum; basal abdominal tergum pale tomentose anteriorly, abruptly broadened on each side to meet the apical, tomentose fascia, the resulting dark patch quadrangular, covered with very short but dense, black tomentum, apical fascia rather broadly interrupted medially; tergum 2 with a similar apical fascia which is somewhat interrupted medially and abruptly and rather broadly extended at each side to the basal margin; terga 3 and 4 with broad, dense, apical fasciae which are very slightly narrowed on each side but again broadened to the lateral margin; tergum 5 more extensively but rather thinly pale tomentose over posterior half or more of disc, partially surrounding the pseudopygidium; tegulae very finely, closely and evenly punctured; punctures coarse, deep, distinct and quite close on face above antennae, becoming slightly finer and densely crowded on vertex, especially back of eyes, fine and densely crowded beneath tomentum of cheeks and face below antennae, clypeus very minutely and densely punctate beneath dense tomentum; scutum, scutellum and axillae quite densely rugoso-punctate throughout, punctures somewhat more distinct toward each side of scutum anteriorly, those on scutellum slightly coarser; pleura rather finely rugoso-punctate, becoming very densely rugose above; punctures on discs of abdominal terga very fine and close, evenly distributed, becoming somewhat more crowded on the more apical terga; pseudopygidium transverse, median length somewhat less than half the apical width.

MALE—Answers to description of female in general, but tomentum of face somewhat more copious; tubercles and base of antennae entirely black; tegulae blackened in part; and thorax laterally and beneath more copiously tomentose; pygidial plate somewhat broader than median length, rather broadly rounded, marginal carina quite distinct, surface somewhat convex and very shallowly and obscurely punctate.

DISTRIBUTION — Minnesota, Wisconsin, Michigan and Illinois; May to August.

HOST—*Colletes eulophi.*

Epeolus oswegoensis new species

MALE—Length 7 mm.; black, including basal segments of antennae and legs, and tubercles; tegulae and segments of flagellum beyond the first more piceous; tibiae and tarsi testaceous, spurs piceous; mandibles black at base, becoming piceous apically; head, thorax and most of abdomen black, the terga narrowly yellowish along rims; lateral ocelli separated from margin of vertex by about their own diameter; cheeks very narrow, about one half width of eye, posterior margin subcarinate, strongly narrowed below; median length of labrum about half the width, with a pair of subapical denticles that are obscured by rather dense, pale pubescence; inner margin of mandibles with a barely perceptible submedian angle; scutellum rounded posteriorly, with a rather deep, median impression, tips of axillae projecting only slightly from sides of scutellum, reaching slightly beyond mid transverse line (similar to *banksi*, fig. 110); wings with the usual three submarginal cells, lightly infuscated, veins brownish; face medially covered with appressed silvery tomentum, quite dense between eyes and over most of clypeus, thinner and suberect on vertex and upper part of face; venter of thorax with dense, silvery tomentum obscuring the surface, and upper part of pleura densely white tomentose; pronotum quite densely whitish tomentose, the tubercles fringed with pale tomentum; scutum with a pair of narrow, submedian lines of pale tomentum on each side of mid-line anteriorly, the latero-anterior areas more thinly tomentose, posterior margin narrowly fringed with the same color; posterior face of propodeum largely bare, triangular dorsal area quite bare; metanotum and lower, posterior surface of scutellum densely white tomentose; anterior face of basal abdominal tergum densely white tomentose, continuous laterally with a broad, dense, apical, transverse, tomentose band, the resulting median black patch broad and very short, covered with black tomentum, narrowed at each extreme side; terga 2-6 with similar, transverse, apical bands of whitish tomentum, discs covered with black tomentum, tergum 2 with a small patch on each extreme side; tegulae very finely and closely but quite distinctly punctate, the punctures fading out toward posterior margin; upper part of face deeply and quite coarsely punctate, the punctures becoming minute and densely crowded below beneath the tomentum and on vertex and cheeks; scutum coarsely and rather closely rugoso-punctate throughout, the scutellum and axillae somewhat more finely punctate; pleura below finely and densely rugoso-punctate, hypoepimeral area more coarsely so; propodeum quite smooth, with fine but distinct punctures, triangle impunctate; discs of abdominal terga very finely, closely and quite regularly punctate beneath dense, black tomentum.

TYPE—Holotype: Male, Oswego, N. Y., Aug. 26, 1936 (K. V. Krombein) [U.S. N.M.].

Epeolus pusillus Cresson
(Fig. 110)

Epeolus pusillus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 393. ♀.
Epeolus pusillus Robertson, 1903. Canad. Ent. 35, pp. 287, 288, ♀ ♂ (key).
Epeolus pusillus Brues, 1903. Ent. News 14, pp. 80, 82. (key).
Epeolus pusillus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 9 mm.; black, antennal scape brownish-testaceous anteriorly, mandibles testaceous, becoming reddened at tips; tegulae and legs testaceous, mid and hind spurs piceous, tubercles and axillae more or less infused with ferruginous; lateral ocelli separated from margin of vertex by a space somewhat less than their diameter; cheeks very narrow, subcarinate posteriorly, becoming still narrower below; labrum nearly twice as broad as median length, with a pair of distinct, subapical tubercles; inner margin of mandibles with a quite distinct submedian angle; hind margin of scutellum very slightly outcurved, much exceeded by the robust, subtriangular axillae which are very broadly joined to lateral margins of scutellum and sub-carinate laterally (fig. 110); wings with the usual three submarginal cells, subhyaline basally, becoming faintly infuscated apically, veins brownish; face quite densely pale tomentose around bases of antennae, over clypeus and cheeks, more thinly so above where it is more yellowish; margin of pronotum and tubercles, a pair of anterior longitudinal lines and extreme lateral margins of scutum, metanotum, and adjacent margin of scutellum, quite densely, pale yellow tomentose; lateral portions of posterior face of propodeum rather thinly pale tomentose, becoming more densely so beneath wing bases above; abdominal terga 1-4 with entire, transverse, yellow tomentose fasciae, these only sub-interrupted medially, somewhat separated from apical margin of discs except on 4, anterior face of tergum

1 densely yellow tomentose, median area black, basal and apical tomentose areas narrowly connected at each extreme side; tergum 5 with a subapical area of pale tomentum which encloses the small pseudopygidium; punctures deep, close and rather coarse on upper part of face, becoming very minute and densely crowded on clypeus and lower part of face, and on cheeks; pleura closely punctate below but with some definite, irregular, shining interspaces evident, very densely crowded above; scutum closely and quite coarsely punctate throughout, punctures more distinct anteriorly, densely crowded posteriorly and over entire scutellum and axillae; tegulae with very fine and close punctures throughout; abdominal terga with minute and very close, uniformly distributed punctures, these obscured by black, plumose tomentum; pseudopygidium very narrow, median length about equal to apical width.

MALE—Answers in general to description of female, but face around and below antennae very densely silvery tomentose, and entire ventral and lateral surfaces of mesothorax, as well as hind coxae, very densely silvery tomentose; pygidium subtriangular, rather narrowly rounded apically, margin carinate, basal width about equal to median length, surface rather sparsely and minutely punctate, with a few very short, suberect hairs.

DISTRIBUTION—Wyoming and Texas to Maine and Florida; April and May in Florida, August to October in the North.

FLOWER RECORDS—*Aster, Erigeron, Eupatorium, Haplopappus, Helenium, Melilotus* and *Solidago.* This is recorded by Robertson (1929) on *Bidens, Boltonia, Coreopsis, Helianthus* and *Polygoneum.*

Epeolus scutellaris Say

(Fig. 110)

Epeolus scutellaris Say, 1824. In Keating, Narr. Long's 2nd Exped., v. 2, p. 355. ♀.

Epeolus scutellaris Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 397. ♀.

Epeolus scutellaris Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 343. ♀ ♂.

Epeolus vernoniae Cockerell, 1907. Entomologist 40, p. 137. ♂. New synonymy

FEMALE—Length 9-10 mm.; black, antennal scape, legs and tegulae testaceous, mandibles, tubercles, narrow margin of the pronotum, lateral margins of scutum, and entire scutellum and axillae, ferruginous, mid and hind spurs rather dark; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about half width of eyes, subcarinate posteriorly, somewhat more narrowed below; median length of labrum somewhat more than half the breadth, with a pair of small, subapical tubercles; inner margin of mandibles with a low, median angle; posterior margin of scutellum nearly straight, very shallowly impressed medially, axillae extensive, subtriangular, broadly joined to lateral margins of scutellum, subcarinate laterally, tips protruding somewhat beyond its posterior margin (fig. 110); wings with the usual three submarginal cells, subhyaline basally, becoming lightly infuscated apically, veins brownish-testaceous; face pale tomentose around bases of antennae, otherwise very thinly pubescent; venter of thorax and anterior face of mesopleura densely tomentose, posterior margin of pronotum, a pair of narrow longitudinal lines on scutum anteriorly, metanotum and adjacent margin of scutellum, all pale yellowish tomentose, tubercles fringed with the same color; abdominal terga 1-4 with transverse, apical, yellow tomentose fasciae, very slightly interrupted medially on 1 and 2, entire on 3 and 4, slightly separated from apical margin on 1-3; tergum 1 with yellow tomentum basally, interrupted medially, interveining black patch very broad, extending nearly from one extreme side to the other, basal and apical yellow tomentose areas very narrowly joined at each extreme side; tegulae with quite deep and slightly separated punctures anteriorly, these becoming much more minute and close posteriorly; vertex and upper part of face rather coarsely and very closely and deeply punctate, the punctures becoming minute and densely crowded over clypeus and lower half of face, those on cheeks close but distinct, not crowded; scutum, scutellum and axillae densely and rather coarsely rugoso-punctate throughout, somewhat more coarsely so on latero-anterior areas; pleura closely punctate below but with a few irregular, shining, intervening spaces evident, becoming densely rugose above; punctures of abdominal terga very fine and uniformly close throughout, finer and more densely crowded on tergum 5, this with a transverse, apical band of pale tomentum covering about half of disc and completely enclosing the pseudopygidium which is broad and quite short, median length slightly less than half the apical width.

MALE—Answers quite fully to description of female, but scutellum either red or black; pygidial plate quite broadly rounded, margin carinate, median length about equal to basal width, surface rather smooth but with some inconspicuous, suberect pubescence.

DISTRIBUTION — Minnesota to Nova Scotia, south to Texas and North Carolina; June (in Texas) to September.

FLOWER RECORDS—*Baccharis*, *Bidens* and *Solidago*.

Epeolus vernalis new species

FEMALE—Length 10 mm.; black, legs, tegulae, tubercles and basal segments of antennae testaceous, spurs yellow, mandibles more ferruginous, and axillae ferruginous in part; segments of the flagellum beyond 1st considerably longer than broad, brownish beneath, piceous above; space between margin of vertex and lateral ocelli subequal to their diameter; cheeks about half width of eyes, much narrower below; posterior margin carinate; median length of labrum somewhat greater than half the breadth, with a pair of very low, acute, apical tubercles; mandibles entirely simple and rather slender, without an inner angle or tooth; posterior margin of scutellum nearly straight, not at all impressed medially, axillae strongly divergent from its side, the acute tips reaching about to mid transverse line of scutellum (similar to *ilicis*, fig. 110); wings with the usual three submarginal cells, hyaline basally, becoming lightly infuscated apically, veins testareous to piceous; face with some dense, sivery, appressed tomentum around bases of antennae, clypeus nearly bare, and cheeks only thinly tomentose; venter of thorax rather thinly, silvery tomentose, pleura nearly bare below, becoming rather densely tomentose above; margin of pronotum densely yellowish tomentose, this continuing as a short fringe around tubercles; scutum with a pair of narrow, yellowish, longitudinal lines anteriorly on each side of midline, and margin adjacent to tegulae very narrowly fringed, a quite dense, yellowish fringe in the scutello-mesothoracic suture; metanotum quite densely whitish tomentose, adjacent lower margin of scutellum thinly tomentose medially but becoming very densely so from each extreme side to base of wings; anterior face of basal abdominal tergum densely white tomentose on each side, separated medially, nearly meeting the apical, transverse, more yellowish fascia which is rather widely interrupted medially, the resulting black patch transverse, narrowed nearly to a point at each extreme side, covered with very short, inconspicuous, black tomentum; terga 2-4 with yellowish, apical fasciae, these becoming somewhat more whitish at each extreme side, and slightly interrupted medially, slightly removed from rims on 2 and 3, tergum 5 with a small patch of white tomentum on each side of pseudopygidium; tegulae uniformly very finely, closely and deeply punctate throughout; face below ocelli rather coarsely, closely and deeply punctate, but punctures distinctly separated, becoming somewhat finer and densely crowded on vertex posteriorly and on cheeks, those below antennae and on clypeus very fine and densely crowded; scutum, scutellum and axillae very densely rugose, finely so at sides of scutum, more coarsely so medially and on scutellum; pleura below rather coarsely rugosopunctate, with a few narrow, indefinite, intervening spaces evident, upper part beneath the tomentum very densely and rather finely rugose; discs of abdominal terga beneath dense black tomentum very finely, uniformly and rather closely punctate, the punctures becoming more minute and crowded on the more apical terga; pseudopygidium about half as long medially as the apical width.

TYPE—Holotype: Female, Holly Shelter, Pender Co., N. C., May 18, 1950 (Mitchell) [author's coll.].

Epeolus weemsi new species

MALE—Length 8 mm.; black, mandibles, tubercles, tegulae and legs in large part testaceous, spurs yellow; basal segment of flagellum somewhat more brownish, following segments more piceous, median segments fully as broad as long; lateral ocelli separated from margin of vertex by a space slightly exceeding their diameter; cheeks about half width of eyes, narrowed below, hind margin subcarinate; median length of labrum nearly half the breadth, with a very small and inconspicuous pair of tubercles apically; mandibles slender and simple, without an inner angle or tooth; posterior margin of scutellum nearly straight, with a very slight and narrow, median impression, axillae widely divergent from sides of scutellum, tips acute, reaching about to mid transverse line of scutellum (similar to *ilicis*, fig. 110); wings with the usual three submarginal cells, very lightly infuscated basally, becoming somewhat more deeply so apically, veins brownish to piceous; face with some dense silvery tomentum between clypeus and antennae and along sides of face, pubescence of head otherwise very thin, short and suberect; venter of thorax densely silvery tomentose over a limited area, pleura otherwise largely bare; pronotum with a marginal fringe of very short greyish-white tomentum, this continuing as a short fringe around tubercles; scutum with a pair of barely visible, longitudinal lines of pale tomentum on each side of midline anteriorly; metanotum densely whitish tomentose, adjacent areas of scutellum not distinctly tomentose; anterior face of basal

abdominal tergum only very thinly whitish tomentose on each side, but apical margins of terga 1-5 more or less whitish fasciate, the fasciae very narrow, slightly removed from rims on 1-3 or 4, distinctly interrupted medially, discs not noticeably black tomentose; tegulae uniformly, very closely, finely and deeply punctate throughout; punctures across upper part of face deep, distinct, rather coarse, close in general, somewhat more widely separated just below ocelli, becoming very fine and densely crowded on lower part of face and clypeus, rather coarse and subcontiguous across vertex, cheeks rugoso-punctate; scutum dull, quite uniformly rugoso-punctate throughout, scutellum and axillae somewhat more coarsely rugoso-punctate; pleura dull, rather coarsely reticulate, becoming densely rugose above; discs of the more basal abdominal terga shining, punctures fine but deep and distinct, well separated on the more basal terga, becoming increasingly close on the more apical terga, median length of pygidial area about equal to the breadth, rather narrowly rounded apically, margins carinate, surface dull but rather smooth.

TYPE — Holotype: Male, Alachua Co., Fla., Feb. 23, 1957 (H. V. Weems, Jr., on *Prunus angustifolia*) [Florida Plant Board].

It seems possible that this is the male of *vernalis,* although there are some differences in the sculpture, and the relationship remains to be proven.

Epeolus zonatus Smith
(Fig. 110)

Epeolus zonatus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 257. ♂ ♀.
Epeolus zonatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 397.

FEMALE—Length 9 mm.; black, antennae, mandibles, legs, tegulae, pronotum and tubercles testaceous, the scutellum, axillae, lateral margins of scutum, and abdominal terga 1 and 2, in large part more ferruginous, spurs yellowish; lateral ocelli separated from margin of vertex by about their own diameter; cheeks less than half width of eyes, posterior margin quite distinctly carinate; labrum nearly twice as broad as its median length, with a pair of median, acute, apical denticles; inner margin of mandibles entire, not at all angulate; scutellum broadly rounded, median impression very faint if at all evident (fig. 110); axillae quite robust, broadly divergent from sides of scutellum, the acute tips reaching about to mid transverse line of scutellum; wings with the usual three submarginal cells, lightly infuscated, somewhat more deeply so apically, veins piceous; face with a limited area of white tomentum between antennae and eyes, margin of pronotum thinly white tomentose, and tubercles with a marginal fringe of

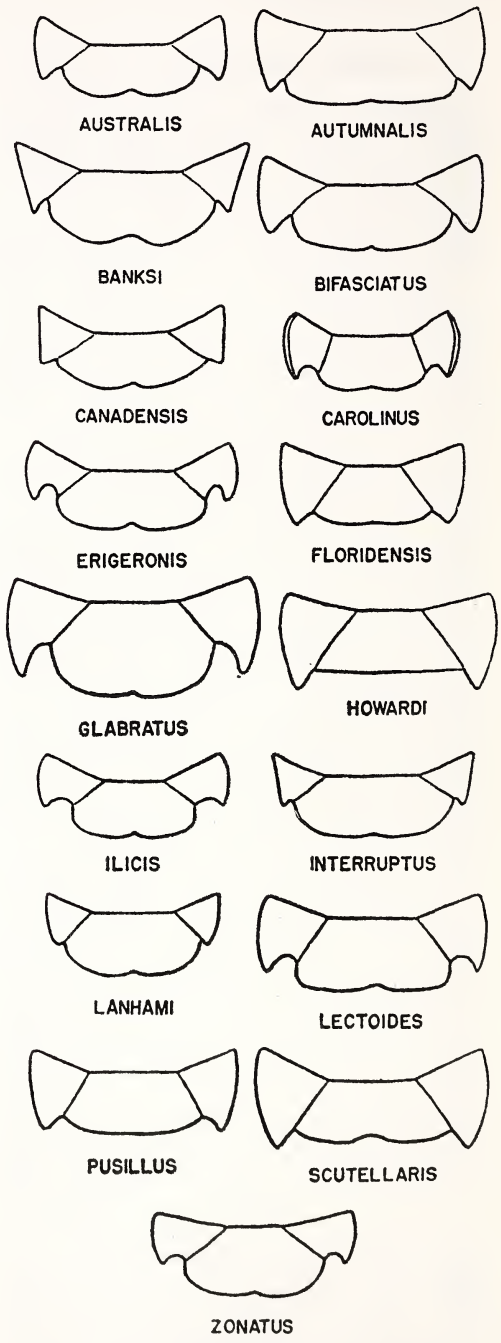


Figure 110
Scutellum and axillae in species of *Epeolus*.

short, white hairs; metanotum quite densely white tomentose beneath the somewhat overhanging scutellum, and extreme lateral margins of propodeum narrowly white tomentose; abdominal terga 1-4 with narrow, subapical, whitish fasciae that are rather widely interrupted medially, tergum 5 without pale tomentum; tegulae uniformly, finely and very closely and distinctly punctate throughout; vertex, cheeks and upper part of face deeply, regularly and rather coarsely and closely punctate, punctures becoming very fine and subcontiguous below antennae and over clypeus; scutum finely and densely rugose throughout, scutellum somewhat more coarsely and distinctly punctate, axillae very finely rugose; pleura rather coarsely rugose below, becoming rather finely so above; abdominal terga shining, punctures very fine and rather close but not crowded, evenly distributed on each tergum, becoming closer and finer on the more apical terga, without the usual black tomentum; pseudopygidium quite extensive, median length somewhat greater than apical width, the silvery tomentose surface rather sharply delimited from the otherwise dark surface of tergum 5.

MALE—Resembles female in general, but pleura somewhat more coarsely and irregularly rugoso-striate or reticulate; pygidial plate subtriangular, rather narrowly rounded at apex, margin carinate, surface rather smooth.

DISTRIBUTION—Georgia and Florida; March to May.

FLOWER RECORDS — *Crataegus* and *Prunus*.

Epeolus mercatus Fabricius

Epeolus mercatus Fabricius, 1804. Systema Piezatorum, p. 389.

Epeolus mercantus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 395.

? Epeolus mercatus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 88.

Cresson (1878) described what he interpreted to be *mercatus,* and some specimens in the U. S. National Museum were probably determined by reference to his description. No specimens indicated as type, nor any apparently identified by Fabricius, have been seen. The very brief description by Fabricius could apply equally well to *Triepeolus pectoralis* or to *Epeolus pusillus*. Therefore, it seems inadvisable to use the name until a more positive identification can be made.

Table 14—Distribution of species of *Epeolus* by states.

	New England						North Central						Mid Atlantic								South-eastern					
Epeolus	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
australis																						X				X	
autumnalis	X			X		X	X		X	X	X											X					
banksi																X			X			X					
bifasciatus						X		X		X	X		X	X	X	X					X	X				X	X
canadensis								X		X			X														
carolinus																						X					X
erigeronis																						X				X	X
floridensis																											X
glabratus																										X	X
howardi																						X					
ilicis				X	X								X								X	X	X			X	
interruptus								X	X					X								X				X	
lanhami	X							X							X												
lectoides				X				X	X							X			X			X				X	
minimus							X	X	X																		
oswegoensis													X														
pusillus	X			X	X	X	X	X		X									X			X		X			X
scutellaris	X	X	X	X		X		X					X	X	X				X			X					
vernalis																						X					
weemsi																											X
zonatus																										X	X

Triepeolus Robertson

(Figs. 67, 108, 111 & 118)

Triepeolus Robertson, 1901. Canad. Ent. 33, p. 231. Type: *Epeolus concavus* Cresson. Orig. desig.

Triepeolus subg. *Synepeolus* Cockerell, 1921. Amer. Mus. Novitates 23, p. 6. Type: *Triepeolus (Synepeolus) insolitus* Cockerell. Monob.

Triepeolus Cockerell, 1928. Colo. Univ. Stud. 16. pp. 107-111. (key)

As the name suggests, *Trieopeolus* is closely related to *Epeolus*, with the body ornamented with spots or bands of pale, appressed tomentum giving them a wasp-like appearance, and the axillae usually well developed, more or less acutely pointed posteriorly. *Triepeolus* differs from *Epeolus* in having 3-segmented maxillary palpi and the marginal cell in the front wing is narrower and more elongate, its length usually exceeding the distance from its tip to the apex of the wing. In the females tergum 5 is modified to form a quite extensive pseudopygidium which is short-setose or pubescent, its length usually equal to its breadth. Sternum 6 is composed of a pair of slender, parallel rods joined at the base by a transverse sclerite, these rods multispinose apically (fig. 108). Males are more difficult to separate from those of *Epeolus* but may be recognized by the difference in the maxillary palpi and marginal cell. Also the average size in *Triepeolus* is greater.

So far as present knowledge indicates, these are parasitic on *Melissodes* and possibly some of the other related eucerine genera.

KEY TO SPECIES

Females

1. Fifth sternum of abdomen concave, slightly downcurved apically ..... *concavus* (Cresson) (p. 464)
   Fifth sternum not concave 2
2. Clypeus bright ferruginous ..... *rufithorax* Graenicher (p. 481)
   Clypeus black 3
3. Abdominal punctures coarse, close, deep and very distinct; axillae long and slender. . *distinctus* (Cresson) (p. 467)
   Abdominal punctures usually minute and close, obscured by short, appressed, black tomentum; if relatively distinct and deep, then the axillae are quite short, only slightly exceeding the mid transverse line of the scutellum 4
4. Pseudopygidium short, apical margin straight, median length only about half the apical width 5
   Length and breadth of pseudopygidium about equal, apical margin broadly rounded 7
5. With but two submarginal cells, the 2nd transverse cubital vein missing or incomplete ..... *obliteratus* Graenicher (p. 477)
   With the usual three submarginal cells 6
6. Pleura closely and rather coarsely punctate, interspaces hardly evident; usually larger (12 mm.) ..... *simplex* Robertson (p. 483)
   Pleura more finely and sparsely punctate, interspaces equalling or exceeding diameter of punctures; usually smaller (10 mm.) ..... *junctus* new species (p. 471)

7(4). Pleura below densely and finely punctate, interspaces very narrow and irregular, if at all evident 8
   Pleura below either more coarsely sculptured, or the punctures to some degree separated 13
8. Axillae extremely short, posterior angles narrowly rounded, closely applied to sides of scutellum; clypeus shining, with very minute, evenly distributed punctures and much larger and more sparse punctures ..... *nevadensis* (Cresson) (p. 475)
   Axillae with acute posterior angles that project considerably from sides of scutellum 9
9. Legs black; basal tergum largely covered with yellow tomentum, with only a small, triangular, median, black patch ..... *remigatus* (Fabricius) (p. 480)
   Basal tergum with a very broad, median, black patch 10
10. Basal half of pseudopygidium covered with fine, dense, pale yellowish tomentum, hiding the surface, apical half with more coarse and suberect setae, the surface not completely obscured .11
    Pseudopygidium uniformly covered with suberect setae, the surface visible . .12
11. Legs bright ferruginous .... *micropygius micropygius* Robertson (p. 474)
    Legs entirely black .... *micropygius atripes* new subspecies (p. 474)

12(10). Legs and tegulae bright ferruginous ..... *helianthi* (Robertson) (p. 470)
Legs and tegulae blackish ..... *coquilletti* Cockerell (p. 465)

13(7). Basal abdominal tergum with a very broad, median, black patch, leaving lateral yellow-tomentose margins which are little if any wider than the apical, tomentose band 14
Basal tergum with a more restricted, subtriangular, black patch, the lateral yellow-tomentose areas much broader than the apical bands 20

14. Pleura below and mesosternum polished and very sparsely punctate; basal tergum with a very broad, quadrangular, median, black patch ..... *pectoralis* (Robertson) (p. 478)
At least the mesosternum closely punctate 15

15. Pleura very coarsely reticulate ..... *rugosus* new species (p. 482)
Pleura distinctly and much more finely punctate 16

16. Tegulae, tibiae and tarsi ferruginous..17
Legs and tegulae black 18

17. Smaller (8 mm.); pale tomentum greyish-white; abdominal tomentose bands entire ..... *michiganensis* new species (p. 473)
Larger (10 mm.); pale tomentum yellowish; abdominal bands to some degree interrupted ..... *cressonii* (Robertsn) (p. 466)

18(16). Smaller (9-10 mm.); axillae extremely short, not reaching mid transverse line of scutellum ..... *charlottensis* new species (p. 462)
Larger (11-12 mm.); axillae more elongate, tips reaching somewhat beyond mid transverse line of scutellum ...19

19. Mesosternum more coarsely and closely punctate, interspaces not exceeding width of punctures, the sparse tomentum fuscous ..... *donatus* (Smith) (p. 467)
Mesosternum more finely and sparsely punctate, interspaces considerably greater than diameter of punctures, the sparse tomentum silvery ..... *georgicus* new species (p. 469)

20(13). Apical pubescent band of basal tergum very narrow and very broadly interrupted, those on 2-4 also very narrow, considerably removed from apical margin and narrowly interrupted medially .. *alachuensis* new species (p. 462)
Apical pubescent bands of terga 1-4 much broader, entire or only very slightly interrupted 21

21. Axillae long and slender, slightly curved, tips about reaching posterior transverse line of scutellum; legs, tegulae, mandibles, labrum and scape ferruginous .. *4-fasciatus atlanticus* new subspecies (p. 479)
Axillae not so long and slender, not reaching posterior transverse line of scutellum 22

22. Labrum, scape, tubercles, trochanters and all following leg segments bright ferruginous ..... *lunatus lunatus* (Say) (p. 472)
Labrum, scape, tubercles and legs entirely black ..... *lunatus concolor* (Robertson) (p. 472)

Males

1. Clypeus bright ferruginous ..... *rufithorax* Graenicher (p. 481)
Clypeus black 2

2. Median black patch of basal tergum of abdomen very broad, quadrangular, the lateral tomentose areas little if any broader than the apical band 3
Median black patch of basal tergum narrower, more or less triangular, the lateral tomentose areas extensive, very much broader than the apical band . 15

3. With but two submarginal cells, the 2nd transverse cubitus reduced or absent ..... *obliteratus* Graenicher (p. 477)
With the usual three submarginal cells 4

4. Pleura, mesosternum, face and clypeus with a dense covering of silvery tomentum, entirely hiding the surface; axillae triangular, posterior angle almost reaching posterior transverse line of scutellum 5
Pleura and clypeus bare in part 6

5. Tegulae, labrum and scape ferruginous; pygidial plate more narrow and elongate, tip narrowly rounded ..... *cressonii* (Robertson) (p. 466)
Tegulae, labrum and scape dark; pygidial plate broadly rounded, not much longer than width of sub-basal transverse ridge .. *pectoralis* (Robertson) (p. 478)

6(4). Apical tomentose band of basal tergum complete, without a median interruption 7
Apical band of basal tergum distinctly interrupted medially 9

7. Axillae very short, projecting but slightly from sides of scutellum; disc of scutum with erect, blackish pubescence over posterior half ..... *nigrihirtus* new species (p. 476)

Axillae slender and elongate apically, scutum without evident black pubescence; autumnal 8

8. Tegulae, legs and apical, depressed areas of abdominal terga ferruginous .... *junctus* new species (p. 471)
Tegulae and legs black ....*floridanus* new species (p. 468)

9(6). Large (15-16 mm.); axillae long and slender, nearly reaching the posterior, transverse line of scutellum; legs, tegulae, mandibles and labrum black .... *monardae* new species (p. 475)
Smaller (13 mm. or less); axillae usually short 10

10. Axillae robust, the free apex diverging conspicuously from sides of scutellum, and nearly equalling the basal part in length .... *micropygius atripes* new ..... subspecies (p. 474)
Axillae less robust, diverging but little from sides of scutellum, the free part much shorter than the more basal part united to scutellum 11

11. Scutellum shining, punctures deep, distinct, rather small but well separated ..... *donatus* (Smith) (p. 467)
Scutellum dull, densely punctate or rugose 12

12. Size large (13 mm.); or tomentose bands of terga 1 and 2 distinctly interrupted medially 13
Smaller; tomentose bands of tergum 2 entire, that on basal tergum only very narrowly interrupted medially 14

13. Larger (13 mm.); tomentose bands on terga 1 and 2 only very slightly interrupted medially, that on 2 subentire.. ..... *cirsianus* new species (p. 463)
Smaller (8 mm.); tomentose bands on terga 1 and 2 rather widely interrupted medially .... *michiganensis* new species (p. 473)

14(12). Legs and tegulae pale ferruginous; scutellum rather broadly and deeply impressed medially; axillae triangular, slightly larger; scutum with a marginal band of yellowish tomentum, wider at antero-lateral angles .... *helianthi* (Robertson) (p. 470)
Legs and tegulae somewhat darker; scutellum but very slightly impressed medially; scutum nearly bare; axillae very small .... *pectoralis* (Robertson) (p. 478)

15(2). Sternum 5 with a subapical fringe of very short hairs; fringe on sternum 4 dense, hairs long and only slightly flexed apically .... *simplex* Robertson (p. 483)
Subapical fringes of sterna 4 and 5 similar, composed of elongate hairs which are quite strongly flexed apically .. 16

16. Axillae joined to sides of scutellum for almost entire length, the free apical angle very short 17
Axillae more elongate, with apical angle acute, diverging considerably from sides of scutellum 20

17. Tomentose fascia on tergum 2 gradually widened laterally, to occupy most of the plate at each extreme side 18
Fascia on tergum 2 abruptly widened at each extreme side, or not at all 19

18. Scutum broadly yellow tomentose anteriorly, without a median interruption, remainder of disc black, without yellow tomentum laterally .... *concavus* (Cresson) (p. 464)
Scutum somewhat less broadly yellow tomentose anteriorly, the yellow band narrowly interrupted, with black medially, the lateral and posterior margins also quite broadly yellow tomentose .. *remigatus* (Fabricius) (p. 480)

19(17). Larger (15 mm.); scutum with a broad, anterior band of yellowish tomentum .... *nevadensis* (Cresson) (p. 475)
Smaller (10 mm.); scutum not yellow tomentose anteriorly 24

20(16). Punctures of abdominal terga coarse, close, deep and very distinct .... *distinctus* (Cresson) (p. 467)
Punctures of terga minute and close, obscured by dense, black tomentum .. 21

21. Scutum anteriorly with dense yellowish tomentum; tergum 2 with fascia gradually broadened on each side, to completely cover lateral areas of disc .... *remigatus* (Fabricius) (p. 480)
Scutum without conspicuous pale tomentum anteriorly; band on tergum 2 of nearly uniform width across plate .. 22

22. Axillae exceptionally long and slender apically; legs, tubercles, tegulae, mandibles, labrum and scape bright ferruginous; black patch of basal tergum very narrow .. *4-fasciatus atlanticus* new ..... subspecies (p. 479)
Axillae of ordinary length; black patch of basal tergum broader, or legs, tegulae, etc., black 23

23. Labrum, base of mandibles, scape, tegulae, tubercles and all legs bright ferruginous, spurs testaceous .... *lunatus lunatus* (Say) (p. 472)
Mandibles, labrum, scape and tubercles entirely black; spurs black 24

24. Tomentum of thorax and base of abdomen more yellowish; scutum dull, rugoso-punctate; pleural punctures irregular, rather coarse and deep, only slightly separated ..... *lunatus concolor* (Robertson) (p. 472)

Tomentum of thorax and abdomen more greyish-white not at all tinged with yellow; scutum shining between distinctly separated punctures; pleura polished, punctures rather widely separated .... *sublunatus* new species (p. 483)

Triepeolus alachuensis new species

FEMALE—Length 10 mm.; black, labrum, basal half of mandibles, tubercles, tegulae, and all legs ferruginous, mid and hind spurs piceous; scape, pedicel and basal segment of flagellum ferruginous, the flagellum otherwise more piceous beneath, blackish above, median segments somewhat longer than broad; space between margin of vertex and lateral ocelli much narrower than their diameter; cheeks somewhat less than half width of eyes, still narrower below, hind margin carinate; median length of labrum somewhat greater than half the breadth, apical margin with a pair of very minute denticles; posterior margin of scutellum rather strongly outcurved, slightly depressed medially, free part of axillae diverging somewhat from sides of scutellum, but rather short, reaching slightly beyond mid transverse line of scutellum (similar to *lunatus*, fig. 112); wings quite deeply infuscated, especially apically, with the usual three submarginal cells, veins blackish; face with a small amount of appressed, yellowish tomentum around bases of antennae, and some elongate, erect, pale hairs above toward ocelli; cheeks thinly pale tomentose, otherwise head largely bare; margin of pronotum, narrow fringe around tubercles, an indefinite patch on upper part of pleura, a pair of small antero-median spots on scutum, and narrow lateral margins of scutum around tegulae, all quite densely yellow tomentose; metanotum and adjacent margin of scutellum quite densely pale tomentose, with some more elongate hairs at each end posterior to wing bases; posterior face of propodeum with some pale tomentum on extreme lateral margins above; anterior face of basal abdominal tergum with an oblique patch of yellow tomentum on each side which is continuous with an abbreviated, very narrow, subapical fascia that is widely interrupted medially, surface otherwise densely black tomentose; tergum 2 with a very narrow, transverse, yellow tomentose fascia which is interrupted and rather widely removed from rim medially; terga 3 and 4 with transverse, very narrow, more whitish fasciae, to some degree removed from rims; tergum 5 with a small, greyish tomentose area on each side of pseudopygidium; tegulae extremely minutely and closely punctate, posterior and lateral margins becoming impunctate; punctures of face below ocelli coarse, deep, distinct and slightly separated, becoming somewhat finer and much closer across vertex and on cheeks, those below antennae very fine and quite densely crowded, clypeus with a narrow, indefinite, median, impunctate line and with scattered, shallow, rather coarse punctures superimposed on the finely and closely punctate field; scutum, scutellum and axillae quite densely and not very coarsely rugoso-punctate, axillae to some degree reddened; pleura shining between deep, distinct, rather coarse and slightly separated punctures, these becoming densely crowded above; punctures of abdominal terga beneath the dense black tomentum minute and close, largely obscured, becoming somewhat deeper and more distinct on the more apical terga; pseudopygidium rather broadly rounded or subtruncate apically, median length about equal to apical width, covered with very fine, short, suberect, dark setae; sternum 5 broadly convex as seen from beneath.

TYPE—Holotype: Female, Alachua Co., Fla., May 12, 1959 (H. V. Weems, Jr., on *Melilotus alba*) [Fla. Plant Board].

Triepeolus charlottensis new species
(Fig. 112)

FEMALE—Length 9 mm.; entirely black, including antennae, tubercles, tegulae and legs; basal segment of flagellum considerably shorter than segment 2, median segments only slightly longer than broad; space between margin of vertex and lateral ocelli considerably less than their diameter; cheeks somewhat more than half as wide as eyes, somewhat narrower below, posterior margin carinate; median length of labrum somewhat greater than half the breadth, apical margin with a pair of very minute, submedian denticles; posterior margin of scutellum strongly outcurved, axillae extremely small, the free part very short, not nearly reaching mid transverse line of scutellum (fig. 112); wings lightly infuscated, with the usual three submarginal cells, veins piceous; face with a very small amount of appressed, silvery tomentum around antennae and toward eyes, and with some more erect, longer, pale hairs above; pronotum very narrowly whitish tomentose, tubercles with a narrow fringe of tomentum, adjacent area of pleura rather thinly pale tomentose; scutum largely black, but with a small tomentose spot at each lat-

eral posterior angle and a very narrow line of tomentum in the scutello-mesothoracic suture; metanotum and adjacent margin of scutellum thinly whitish tomentose, with a tuft of elongate pale hairs at each end posterior to wing bases; basal abdominal tergum with anterior face greyish-white tomentose, and with a distinctly separated, subapical, transverse fascia of the same color which is interrupted medially, the intervening area black tomentose; terga 2-4 with transverse, whitish tomentose fasciae, that on 2 constricted or nearly interrupted medially and slightly removed from rim, that on 3 also removed from rim but continuous, that on 4 completely apical and uninterrupted; tergum 5 broadly pale tomentose on each side of the small pseudopygidium; tegulae very minutely and obscurely punctate along inner margin, becoming quite broadly impunctate along outer and posterior margins; punctures above antennae quite deep, distinct, coarse and rather close but not crowded, becoming quite sparse between lateral ocelli and eyes, somewhat finer across vertex, and rather fine and distinctly separated on the shining cheeks; scutum shining between deep, distinct, slightly separated and not very coarse punctures, those on scutellum somewhat finer but quite distinct, slightly separated and very fine on axillae; pleura below shining between deep, distinct, rather coarse and well separated punctures, becoming densely crowded above; punctures of abdominal terga beneath the black tomentum minute, close and quite uniform throughout; pseudopygidium relatively small, median length less than the apical width, covered with very short, suberect and very fine, pale setae; sternum 5 broadly rounded apically, strongly convex as seen from beneath.

TYPES — Holotype: Female, Charlotte Co., New Brunswick, Sept. 10, 1956 (W. T. A. Neilson). Paratypes: 2 ♀♀, topotypical, Sept. 6 & 10.

Although positive records of this species south of the Canadian border are lacking, it seems probable that it does occur.

Triepeolus cirsianus new species

MALE—Length 13 mm.; entirely black, with only the more apical tarsal segments somewhat reddened; basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; space between margin of vertex and lateral ocelli subequal to their diameter; cheeks about half width of eyes, somewhat narrower below, posterior margin distinctly carinate; median length of labrum somewhat greater than half the breadth, apical margin with a pair of minute, submedian denticles; posterior margin of scutellum broadly outcurved, slightly impressed medially, free part of axillae short, tips about reaching mid transverse line of scutellum (similar to *pectoralis*, fig. 112); wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, veins testaceous to piceous; face around and below antennae quite densely whitish tomentose, more thinly so on clypeus, area above antennae with more elongate, suberect, thin, white pubescence; margin of pronotum narrowly whitish tomentose, continuing as a narrow fringe around tubercles, pleura rather thinly pale tomentose above; scutum with a pair of rather elongate but somewhat indefinite anterior patches of pale tomentum, the lateral anterior margins quite broadly pale tomentose, reaching the posterior lateral angles; metanotum and adjacent margin of scutellum whitish tomentose, with a dense tuft of elongate, whitish hairs at each end posterior to wings bases; posterior face of propodeum very thinly and obscurely tomentose, triangle entirely bare; basal abdominal tergum whitish tomentose on anterior face and across posterior margin as a broad, slightly interrupted, subapical fascia, these broadly united at each side, the resulting black tomentose patch transverse, very wide, slightly narrowed toward each end; tergum 2 with a transverse, subapical white, tomentose fascia and a rather small patch of white tomentum at each extreme side, that does not quite reach basal margin; terga 3-6 with transverse, whitish tomentose fasciae, these subapical in position on 3 and 4, more nearly apical on 5 and 6; pygidial plate strongly elevated above disc of tergum 7, with an inconspicuous transverse ridge, area beyond this rather narrow and elongate, narrowly rounded apically, margin carinate, surface rather smooth; sterna 4 and 5 with subapical fringes of rather elongate or curved hairs, those on 4 pale, fuscous on 5; tegulae minutely and rather closely punctate but with some evident spaces near center; punctures of face below ocelli coarse, deep, distinct and quite close, somewhat more sparse between ocelli and eyes, somewhat finer and very close across vertex, those on cheeks slightly separated; punctures of scutum quite deep and distinct, slightly separated on each side of midline, becoming quite densely crowded on each side and toward posterior margin, scutellum and axillae more finely and quite densely punctate; pleura rather coarsely and irregularly punctate below, with a few shining interspaces evident, becoming quite densely rugoso-punctate above, beneath the tomentum; punctures of abdominal terga beneath

the black tomentum very fine and uniformly close throughout.

TYPE — Holotype: Male, Warren Co., Indiana, Aug. 11, 1953 (Montgomery, on thistle) [Purdue].

Triepeolus concavus (Cresson)

(Figs. 111 & 112)

Epeolus concavus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 85. ♀.
Epeolus concavus Brues, 1903. Ent. News 14, p. 81. ♀ ♂.
Triepeolus concavus, Robertson, 1903. Canad. Ent. 33, pp. 284, 285. ♀ ♂ (key)
Triepeolus concavus Cockerell, 1921. Amer. Mus. Novitates 23, p. 13. (key)
Triepeolus concavus Custer, 1928. Canad. Ent. 60, p. 28. (biology)
Triepeolus concavus Custer, 1929. Psyche 36, p. 293. (biology)
Triepeolus concavus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 16 mm.; black, including tegulae and legs, antennal flagellum more piceous beneath, the basal segment dull ferruginous; space separating lateral ocelli from margin of vertex about equal to their diameter; cheeks about half width of eyes, somewhat narrower below, posterior margin carinate; median length of labrum about two-thirds the breadth; hind margin of scutellum quite strongly outcurved but with a broad and deep median impression, free part of axillae short, reaching slightly beyond mid-transverse line of scutellum (fig. 112); wings fuliginous, with the usual three submarginal cells, veins piceous; face below antennae largely bare, with short, erect, largely dark hairs above, pubescence of legs and ventral portion of thorax entirely black and largely appressed where evident; pronotum, tubercles, adjacent dorsal area of pleura, anterior half of scutum, a narrow line in scutello-mesothoracic suture, upper portion of posterior face of propodeum, metanotum and adjacent margin of scutellum covered with dense, appressed, yellow tomentum; basal abdominal tergum almost entirely yellow tomentose above, with a very small, median area and anterior face black, apical rim very narrowly black; tergum 2 yellow tomentose except for a semicircular, median, basal, black area, the rim narrowly black; tergum 3 with a broad transverse band of yellow tomentum that occupies nearly the entire plate on each side, but is broadly incurved, basal half medially black tomentose; tergum 4 black tomentose basally, with a relatively narrow, transverse, yellow tomentose band, the narrow rim black; tergum 5 quite strongly narrowed apically, the pseudopygidium forming the abruptly truncate tip, disc of plate somewhat shining, with rather coarse and sparse punctures, these becoming extremely minute and densely crowded laterally and basally; sternum 5 somewhat protuberant beyond tip of tergum, lower surface broadly concave; pleura, scutellum and axillae

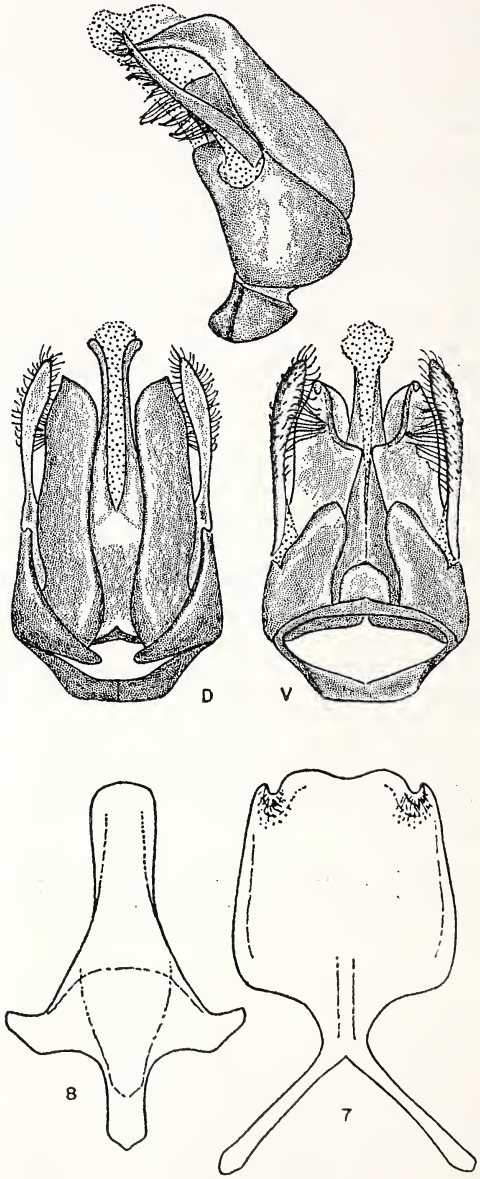


Figure 111
Sterna 7 and 8, and dorsal, ventral and lateral views of genital armature in male of *Triepeolus concavus*.

densely and finely punctate, scutum with somewhat more distinct and slightly coarser but very close punctures posteriorly, clypeus and lower part of face doubly punctate, with scattered, rather coarse but shallow punctures on a minutely, densely punctate field; outer surface of front and hind tibiae quite coarsely tuberculate.

MALE—Answers in general to description of female; sterna 4 and 5 with apical fringes of robust, black, apically curved bristles; pygidial plate strongly elevated above disc of tergum 7, rather elongate, narrowly rounded apically, margin carinate, with a median transverse ridge beyond which the surface is quite smooth, the more basal area very densely and minutely punctate and with fine, subappressed pubescence.

DISTRIBUTION—In the East, Wisconsin and Illinois to North Carolina and Florida; June to September.

FLOWER RECORDS—*Cosmos* and *Helenium*. This is recorded by Robertson (1929) on *Bidens, Blephilia, Brauneria, Cephalanthus, Cirsium, Coreopsis, Helianthus, Heliopsis, Lepachys, Lespedeza, Liatris, Lythrum, Monarda, Nepeta, Petalostemum, Pycnanthemum, Silphium, Teucrium, Verbena* and *Vernonia*.

HOST—*Svastra obliqua*.

Triepeolus coquilletti Cockerell

Triepeolus coquilletti Cockerell, 1905. South. Calif. Acad. Sci. Bul. 4, p. 106. ♀.

FEMALE—Length 10.5 mm.; black, the mandibles apically, basal segment of flagellum, hind basitarsi and the more distal segments of all tarsi, reddened; flagellum beyond basal segment, outer margin of tegulae, hind tibiae apically, mid basitarsi, hind spurs, all sterna, and lateral margins of abdominal terga, obscurely ferruginous; space between margin of vertex and lateral ocelli less than their diameter; cheeks less than half width of eyes, hind margin subcarinate below; labrum with a pair of small teeth at apex, its median length about two-thirds the breadth; length of segment 2 of flagellum nearly twice the breadth, following segments longer than broad; axillae short, acute, not reaching beyond mid transverse line of scutellum, not carinate laterally; hind margin of scutellum broadly rounded, slightly impressed medially; sternum 5 straight in profile; length of pseudopygidium equal to its breadth; face below antennae dull, densely and finely rugoso-punctate, with scattered coarser punctures, area above antennae more shining between slightly coarser, oblique punctures, vertex densely and finely punctate laterally; scutum and hypoepimeral area densely rugoso-punctate throughout, the mesopleura more finely and regularly punctate, the punctures becoming somewhat separated below; tegulae finely and rather sparsely and obscurely punctate, outer margins broadly impunctate; abdominal terga densely, finely and regularly punctate, the sterna more shining, punctures less dense, those on sternum 5 very dense and fine; pubescence very fine and inconspicuous, not concealing surface, with dense, plumose, appressed, pale yellowish tomentum forming a well-defined pattern, paler on face, on tergum 5 and on sterna; dense and appressed around antennal fossae, thinner and erect on vertex and occiput; dorsal surface of pronotum densely yellow tomentose, continuous with a fringe surrounding tubercles, these thinly clothed, a narrow tomentose band beneath tegulae and tubercles joining a transverse band on pleura, extending back beneath hypoepimeral area which is nearly bare; scutum with a pair of narrow and elongate, submedian, discal marks, lateral margins with anterior and posterior marks narrowly joined above tegulae, scutellomesonotal suture with a narrow line of tomentum; metanotum and posterior face of scutellum with dense tomentum, a tuft of long, erect pubescence on each side of metanotum above; mid and hind coxae with densely tomentose areas, the propodeum more thinly pale pubescent outside triangle; basal abdominal tergum with anterior triangular marks, the apices of which just meet medially, the subapical fascia rather broad, narrowly interrupted medially, broadly joined to anterior marks laterally, resulting in a parallel-sided, blackened area that is nearly twice as broad as the apical fascia; terga 2-4 with similar but entire subapical fasciae, that on 2 laterally with anterior extensions of rather thin tomentum, that on 3 only slightly encroaching on disc laterally, and that on 4 entirely confined to marginal area, those on 1-3 gradually diverging from posterior margin toward mid line; tergum 5 with subtriangular marks laterad of pseudopygidium; sternum 2 with a few pale hairs postero-laterally, 3 and 4 with distinct though thin, lateral, apical, transverse markings; pubescence of sterna 2-4 in general very fine and obscure, that on 5 more evident; setae of pseudopygidium fine, moderately long, subdecumbent, regular and pale.

DISTRIBUTION—California to Mississippi, October.

Two females of this species were collected by C. D. Michener in the vicinity

of Hattiesburg, Mississippi, but efforts to locate them have been fruitless. The type, from California, is in the U. S. National Museum, and the description above has been paraphrased from one by Major Donald B. Baker which he wrote and sent this writer while engaged in some studies at the Museum.

Triepeolus cressonii cressonii (Robertson)

(Fig. 112)

Epeolus cressonii Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 344. ♂ ♀.

Triepeolus cressonii Robertson, 1903. Canad. Ent. 33, pp. 286 & 287. ♂ ♀. (key)

Triepeolus cressonii Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, labrum, mandibles, tibiae, tarsi and tegulae testaceous, basal portions of legs testaceous, with darkened areas, spurs piceous, tubercles only faintly reddened along outer margin; space between margin of vertex and lateral ocelli somewhat less than their diameter; cheeks about half width of eyes, narrower below, posterior margin carinate; segments of flagellum beyond the first somewhat longer than broad, piceous below, more blackish above; median length of labrum nearly two-thirds the breadth, apical margin medially with a pair of very small denticles; posterior margin of scutellum broadly outcurved, faintly impressed medially, free part of axillae quite short, tips about reaching mid transverse line of scutellum (fig. 112); wings lightly infuscated, somewhat more deeply so apically, with the usual three submarginal cells, veins piceous; face with some rather dense, pale, appressed tomentum around bases of antennae; margin of pronotum quite densely but narrowly pale tomentose, tubercles with a similar narrow fringe, and pleura with a small transverse tomentose patch near upper third; scutum with a pair of narrow, longitudinal bands of pale tomentum anteriorly on each side of mid-line and a small patch at each extreme side posteriorly; metanotum and adjacent margin of scutellum rather thinly pale tomentose, posterior face of propodeum, except the triangle, thinly pale tomentose on each side; basal abdominal tergum with a transverse, median patch of black tomentum, with dense yellow tomentum both anteriorly and posteriorly, these about equal and slightly interrupted medially, rather narrowly joined at extreme side; tergum 2 with a subapical tomentose fascia which is slightly interrupted medially, disc with a rather small patch of tomentum on each extreme side; terga 3 and 4 with subapical, tomentose bands, more or less separated from rims of terga toward mid-line; tergum 5 very thinly greyish tomentose on each side of pseudopygidium; punctures of face above quite coarse, deep and distinct, somewhat separated, interspaces shining, these becoming somewhat finer and quite closely crowded on margin of vertex and on cheeks below, face below with densely crowded, fine punctures, but clypeus with a few very shallow, coarse punctures; scutum rather coarsely and quite closely punctate throughout, the punctures somewhat more distinct on median, anterior area, more densely crowded and indefinite laterally and on scutellum and axillae; pleura below shining between rather coarse and deep punctures, these well separated in part but not sparse, becoming densely crowded and somewhat finer above; punctures of abdominal terga very fine and close but relatively deep and distinct, especially on the more apical terga; pseudopygidium nearly as long medially as the apical breadth, rather closely set with fine setae; sternum 5 broadly convex as seen from beneath.

MALE—Answers in general to description of female; face somewhat more densely, silvery tomentose, this extending over the clypeus; segments of flagellum somewhat shorter, being scarcely longer than broad; venter of thorax densely silvery tomentose, this continuing more thinly over the pleura; terga 5 and 6 with transverse, pale tomentose fasciae; sterna 4 and 5 with apical fringes of curved setae; pygidial plate strongly elevated above disc of tergum 7, apical part beyond the transverse ridge not much longer than broad, rather broadly rounded, surface smooth, margin subcarinate, area basal to the ridge with dense but rather shallow punctures and short fine pubescence.

DISTRIBUTION — Minnesota to the New England states, south to Tennessee and North Carolina; June to September.

FLOWER RECORDS — *Eupatorium, Helianthus, Polygala, Pycnanthemum* and *Vernonia.* Robertson (1929) records *cressonii* on *Aster, Bidens, Blephilia, Boltonia, Helenium, Heliopsis, Lepachys, Rudbeckia, Solidago* and *Verbena.*

This subspecific designation of *cressonii* is made necessary by the recognition of another form occurring in the Southwest.

Triepeolus distinctus (Cresson) new combination

(Fig. 112)

Epeolus distinctus Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 84. ♂ ♀.

FEMALE—Length 13.5 mm.; black, labrum and mandibles slightly reddened, tibiae dark red at base and apex on front and mid legs, tubercles and tegulae dark red; lateral ocelli separated from margin of vertex by about their own diameter; cheeks about half width of eyes, slightly narrower below, posterior margin carinate; basal segment of flagellum about equalling segment 2, following segments considerably longer than broad; median length of labrum about half the breadth, apical margin with a pair of quite distinct, acute denticles; scutellum slightly outcurved posteriorly, with a quite deep, median impression, free part of axillae slender and elongate, reaching posterior transverse line of scutellum (fig. 112); wings deeply infuscated, with the usual three submarginal cells, veins black; pubescence on face very thin and sparse, somewhat more dense and elongate around bases of antennae; margin of pronotum quite densely whitish tomentose, a similar short fringe around tubercles; scutum with a pair of anterior, very narrow, longitudinal lines of whitish tomentum, the lateral margins and scutello-mesothoracic suture very narrowly white tomentose; metanotum and adjacent margin of scutellum thinly greyish tomentose medially, becoming somewhat more densely so at each side; lateral areas of posterior face of propodeum rather densely greyish tomentose; basal abdominal tergum yellow tomentose in large part, with a small, median, sub-basal black patch which is slightly broader than its median length; terga 3-5 with rather dense, transverse, pale yellowish fasciae, these slightly separated from the somewhat yellowish, rather deeply depressed, apical rims of the terga; tergum 5 without conspicuous pale tomentum; inner margins of tegulae very finely and densely punctate, outer rims becoming broadly polished and impunctate; punctures of face above quite coarse, deep and distinct, rather widely separated between ocelli and eyes, becoming close across vertex, back of ocelli and on cheeks, somewhat finer and closer but still deep and distinct below antennae, slightly separated on upper part of clypeus, becoming somewhat finer and closer toward apical margin; punctures coarse, deep and quite close over most of scutum, but with shining interspaces evident on each side of median area anteriorly, much finer and quite densely crowded on scutellum, but axillae with coarse, scattered, well separated punctures; punctures of pleura deep and quite coarse, well separated below, becoming quite densely rugoso-punctate above; basal abdominal tergum very finely and closely punctate throughout, punctures on discs of 2-4 becoming somewhat coarser and less close, rather well separated on 4, and somewhat finer but well separated on 5; pseudopygidium abruptly truncate apically, median length about equal to apical width, covered with very fine, pale tomentum (somewhat as on *Epeolus*); sternum 5 strongly convex as seen from beneath, quite strongly narrowed apically.

MALE—Answers in general to description of female; apical tomentose areas of abdominal terga somewhat more abruptly and deeply depressed; terga 5 and 6 quite densely whitish fasciate apically; apical fringes of sterna 4 and 5 composed of elongate, relatively fine and straight hairs; pygidial plate strongly elevated above disc of tergum 7, transverse ridge very low and obscure, margin carinate and rather evenly rounded apically, basal width about equal to median length.

DISTRIBUTION—Georgia and Florida; September.

Triepeolus donatus (Smith)

Epeolus donatus Smith, 1854. Cat. Hym. Brit. Mus., v. 2, p. 256. ♀ ♂.

Epeolus donatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 396. ♀ ♂.

Triepeolus donatus Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)

Triepeolus donatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 11 mm.; entirely black, including antennae, legs and tegulae; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about half width of eyes, slightly narrower below, posterior margin carinate; median length of labrum about two-thirds the breadth, apical margin with a pair of very minute denticles; basal segment of flagellum only slightly shorter than segment 2, median segments considerably longer than broad; posterior margin of scutellum broadly outcurved, very faintly impressed medially, free part of axillae very short, tips barely attaining mid transverse line of scutellum (similar to *cressonii*, fig. 112); wings lightly and rather uniformly infuscated, with the usual three submarginal cells, veins piceous to black; face with a small amount of appressed silvery tomentum between bases of antennae and eyes, with somewhat thinner but more elongate and erect pubescence above antennae; margin of pronotum rather narrowly whitish tomentose,

tubercles with a fringe of short, whitish hairs; scutum with a pair of elongate patches of pale pubescence on each side of mid-line and just anterior to transverse mid-line, lateral margins and scutello-mesothoracic suture thinly tomentose; metanotum and adjacent margin of scutellum rather densely whitish tomentose, with some elongate, whitish hairs at each end, back of wings, the adjacent lateral areas of propodeum more or less densely whitish tomentose; pleura above with a rather small patch of white tomentum adjacent to tubercles and tegulae; basal abdominal tergum with a very broad, transverse, black tomentose patch anterior face largely whitish tomentose, and apical impressed area with a dense, transverse, whitish fascia, these rather narrowly connected at each extreme side, the fascia slightly interrupted medially; terga 2-4 with rather broad, transverse apical fasciae, these slightly separated from rims on 2 and 3 and tergum 2 with a very small, lateral patch toward each side projecting from anterior margin of the fascia; tergum 5 with a rather extensive, lateral patch of greyish-white tomentum on each side; tegulae with minute, dense ly crowded punctures on inner side, becoming more sparsely punctate to the outer impunctate rims; punctures of face above antennae rather irregular, very close, coarse and deep, becoming somewhat more regular but also finer and crowded on cheeks below, very fine and densely crowded below antennae, clypeus with scattered, shallow, coarse punctures on a more finely punctate field; scutum rather coarsely and closely punctate throughout, punctures somewhat more distinctly separated along mid-line toward anterior third, those on scutellum somewhat finer and only slightly separated, those on axillae sightly coarser; pleura below shining, punctures quite deep and distinct, well separated but not sparse, becoming quite densely crowded over upper half; punctures of abdominal terga beneath the dense, black tomentum rather minute and close throughout, those on tergum 5 somewhat more distinct but still very close; pseudopygidium about as broad as its median length, evenly rounded apically, covered with fine, erect but quite short setae; sternum 5 broadly convex in ventral view.

MALE—Answers in general to description of female; segments of antennae somewhat shorter, very slightly longer than broad; lower part of face more densely pale tomentose, and upper part more copiously pubescent; punctures of scutum and scutellum somewhat less densely crowded, median impression of scutellum somewhat more distinct; terga 5 and 6 with rather dense and entire, whitish, apical fasciae; sterna 4 and 5 with rather thin, subapical fringes of elongate, slightly curved setae; pygidial plate strongly elevated above disc of tergum 7, apical portion beyond the transverse ridge slightly longer than broad, rather narrowly rounded, margin carinate, with a few scattered, shallow punctures, the more basal area very densely and finely punctate and thinly tomentose.

DISTRIBUTION—Wisconsin to the New England states, south to Georgia; July to October.

FLOWER RECORDS—*Aster, Chrysopsis, Cirsium* and *Helianthus.* Robertson (1929) records this species on *Bidens, Coreopsis, Eupatorium, Polygonum, Rudbeckia* and *Verbena.*

Triepeolus floridanus new species

MALE—Length 9.5 mm.; entirely black, only mandibles and tegulae somewhat reddened; basal segment of flagellum considerably shorter than segment 2, median segments very slightly longer than broad; space between margin of vertex and lateral ocelli equal to about half their diameter; cheeks about half width of eyes, slightly narrowed below, posterior margin carinate; median length of labrum slightly greater than half the breadth, apical margin with a pair of very small, submedian denticles; posterior margin of scutellum broadly outcurved, quite deeply impressed medially, free part of axillae quite strongly divergent from sides of scutellum, tips reaching considerably beyond transverse median line (similar to *lunatus*, fig. 112); wings subhyaline, with the usual three submarginal cells, veins piceous; face medially with considerable dense, silvery tomentum, reaching slightly above eyes and to upper margin of clypeus below, upper part of face with rather sparse but more elongate and erect, whitish hairs; margin of pronotum quite densely whitish tomentose, this continuing as a narrow fringe around tubercles, and pleura above with a rather narrow, transverse, whitish, tomentose band; scutum with a pair of elongate anterior, rather indefinite lines of white tomentum, and with some white tomentum at each extreme angle anteriorly, adjacent to tubercles, the scutello-mesothoracic suture very narrowly and obscurely whitish tomentose; metanotum and adjacent margin of scutellum densely pale tomentose, with a dense tuft of elongate, whitish hairs at each end, posterior to wing bases; posterior face of propodeum thinly whitish tomentose, becoming more densely so at each lateral margin, triangle completely bare; basal abdominal tergum whitish tomentose anteriorly, with

a subapical, transverse, whitish tomentose fascia which is slightly interrupted medially, these rather narrowly united at each extreme side, the resulting black patch broadly transverse; tergum 2 with a transverse, subapical fascia and a tomentose patch at each extreme side, impressed, apical portion of disc beneath the fascia yellowish-hyaline; terga 3-6 yellowish-hyaline apically, the impressed areas whitish tomentose, reaching nearly to apical rims; tegulae minutely and very closely punctate along inner and anterior borders, becoming rather broadly impunctate laterally and posteriorly; punctures below ocelli coarse, deep, distinct and slightly separated, interspaces shining, rather sparse between eyes and ocelli, becoming relatively fine and close across vertex, cheeks shining between rather fine, deep and distinct, slightly separated punctures; face below antennae very finely and densely punctate, surface hidden beneath pale tomentum, exposed over most of clypeus; punctures of scutum rather deep and coarse, slightly separated in general over anterior half, becoming rather densely crowded at each extreme side and across posterior border; scutellum and axillae with punctures much as on scutum; pleura below shining between quite coarse, deep, distinct and well separated punctures, these becoming densely crowded above; discs of abdominal terga beneath the black tomentum with very fine, very close, uniformly distributed punctures throughout; pygidial plate strongly elevated above disc of tergum 7, triangular in outline, very narrowly rounded at tip, with a very vague, sub-basal, transverse ridge, margin carinate, surface shallowly and closely pitted; sterna 4 and 5 with subapical fringes of elongate, apically flexed, brownish setae.

TYPE — Holotype: Male, Gainesville, Fla., Oct. 28, 1956 (H. V. Weems, Jr.) [Fla. Plant Board].

Triepeolus georgicus new species
(Fig. 112)

FEMALE—Length 11.5 mm.; entirely black, including labrum, mandibles, tubercles, tegulae and legs; basal segment of flagellum ferruginous in part, considerably shorter than segment 2, median segments somewhat longer than broad, piceous beneath, black above, the scape and pedicel black; space between margin of vertex and lateral ocelli less than half their diameter; cheeks very narrow, little more than one third width of eye, carinate posteriorly; median length of labrum slightly more than half the breadth, apical margin with a submedian pair of very minute denticles; posterior margin of scutellum broadly outcurved, slightly impressed medially, free part of axillae short, but reaching mid transverse line of scutellum (fig. 112); wings subhyaline basally, becoming very faintly infuscated apically, with the usual three submarginal cells, veins piceous; face above clypeus and around bases of antennae quite densely silvery tomentose, cheeks rather thinly tomentose, area just below ocelli with more elongate, erect, thin, whitish pubescence; margin of pronotum with a narrow, white tomentose band that continues as a marginal fringe around tubercles; pleura above rather densely whitish tomentose; scutum with a submedian pair of elongate, tomentose patches anteriorly, lateral margins thinly tomentose, and scutellomesothoracic suture with a very fine line of whitish tomentum; metanotum and adjacent margin of scutellum whitish tomentose, with a tuft of elongate, whitish hairs at each end posterior to wing bases; posterior face of propodeum rather thinly white tomentose, becoming more densely so at extreme sides, triangle completely bare; basal abdominal tergum whitish tomentose on anterior face, and with a subapical tomentose band which is slightly interrupted medially, these rather narrowly united at each extreme side, the resulting black tomentose patch very broad; tergum 2 with a subapical, tomentose fascia which is subinterrupted medially, and a somewhat oblique patch at extreme side which unites with the fascia and reaches the basal margin; terga 3 and 4 with transverse, whitish tomentose fasciae that on 3 slightly removed from rim, that on 4 nearly apical; tergum 5 with a whitish tomentose patch on each side of pseudopygidium; tegulae very minutely and closely punctate along inner margin, becoming rather narrowly impunctate laterally, more broadly so posteriorly; punctures of face below ocelli deep, distinct, quite coarse and well separated but hardly sparse, becoming more sparse between ocelli and eyes above, minute and slightly separated on the shining cheeks; anterior and median areas of scutum with deep, distinct, slightly separated punctures which are not very coarse, becoming somewhat more finely and densely punctate posteriorly, the scutellum rather finely rugosopunctate, axillae with fine, slightly separated punctures; pleura below shining between rather fine but distinct punctures, interspaces slightly greater than diameter of punctures in general, but becoming densely and finely rugoso-punctate above; discs of abdominal terga beneath the black tomentum with fine and regular but quite distinct, slightly separated punctures throughout; pseudopygidium about as broad as the median length, broadly outcurved apically, covered with short, fine, suberect, fuscous setae, but lateral basal areas

becoming more densely fuscous tomentose; sternum 5 broadly convex as seen from beneath.

TYPE—Holotype: Female, Fort Gordan, Richmond Co., Ga., Sept. 24, 1958 (R. R. Snelling). [author's coll.].

Triepeolus helianthi helianthi (Robertson)

Epeolus helianthi Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 344. ♀.

Triepeolus helianthi Robertson, 1903. Canad. Ent. 33, pp. 286, 287. ♂ ♀. (key)

Triepeolus helianthi Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, pp. 164-166. (biology)

Triepeolus helianthi Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 62. ♀. (key)

Triepeolus helianthi Cockerell, 1921. Amer. Mus. Novitates 23, pp. 3, 15. (key)

Triepeolus helianthi Robertson, 1929. Flower and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, mandibles somewhat yellowish apically, basal segment of flagellum dark ferruginous, following segments somewhat longer than broad, piceous below, black above; mid and hind legs largely testaceous, with blackish spurs, the front legs dark, becoming somewhat yellowish on the more apical tarsal segments; tubercles and tegulae black; lateral ocelli separated from margin of vertex by about half their diameter; cheeks less than half width of eyes, slightly narrower below, hind margin subcarinate; median length of labrum about two-thirds the breadth, apical margin with a pair of very minute denticles; posterior margin of scutellum broadly outcurved, faintly impressed medially, free part of axillae short, reaching mid transverse line of scutellum (similar to *cressonii*, fig. 112); wings subhyaline, with the usual three submarginal cells, veins brownish-piceous; face with a small amount of appressed, whitish tomentum around bases of antennae, with scattered, more erect hairs above; margin of pronotum densely pale yellowish tomentose, tubercles with a narrow fringe of the same color, and adjacent area of pleura narrowly tomentose, this continuous with a transverse elongate patch of tomentum at upper third of pleura; scutum with a pair of rather elongate patches of pale tomentum toward anterior margin, lateral margins with a small patch of pale hairs anterior to the tegulae, and a small, more dense patch at posterio-lateral angle, the scutello-mesothoracic suture narrowly pale tomentose; metanotum and adjacent margin of scutellum densely pale tomentose, with a tuft of elongate, whitish hairs at each side back of wing bases; basal abdominal tergum with a broad, transverse, black tomentose patch, an area anterior to this yellow tomentose, slightly interrupted medially, and apical margin with a transverse fascia which is interrupted medially, these rather broadly connected at each extreme side; terga 2-4 with transverse, apical, tomentose fasciae, these slightly separated from rims on 2 and 3, tergum 2 with a lateral tomentose patch anterior to the fascia; lateral areas of tergum 5 densely pale tomentose on each side of pseudopygidium; tegulae finely and densely punctate along inner margins and over much of surface, outer rims becoming rather narrowly impunctate; punctures of face above antennae coarse, deep, distinct and somewhat separated, the interspaces shining, punctures becoming finer and crowded along margin of vertex and on cheeks; face below antennae densely and very finely punctate, clypeus with scattered, shallow, somewhat coarser punctures superimposed on the more finely punctate field; scutum densely rugoso-punctate throughout, scutellum and axillae somewhat more finely so, venter of thorax with quite deep, distinct, but very close punctures, these becoming densely crowded above, sometimes with a few shining narrow interspaces evident anterior to mid coxae; discs of abdominal terga beneath the black tomentum very fine and close, regularly distributed, becoming more densely crowded on the more apical terga; median length of pseudopygidium about equal to the apical width, apical margin with broadly rounded surface, covered with very short, suberect, pale setae; sternum 5 broadly concave as viewed from beneath.

MALE—Similar to female in most respects; face with more extensive, pale, appressed tomentum, extending down onto clypeus; scutum with much pale yellowish tomentum over anterior half, the scutello-mesothoracic suture more densely fringed with yellowish tomentum; venter of thorax densely silvery tomentose, this extending somewhat more thinly on pleura above, becoming very dense on the upper portion; apical margins of terga 5 and 6 densely whitish fasciate; sterna 4 and 5 with subapical fringes of elongate, somewhat curved setae; pygidial plate strongly elevated above disc of tergum 7, apical por-

tion beyond transverse ridge about as long as breadth, evenly rounded, margin carinate, surface quite smooth, the more basal area very finely and closely punctate and with rather dense, short pubescence.

DISTRIBUTION—Wyoming to Wisconsin, Illinois and Indiana; August and September.

FLOWER RECORDS — *Grindelia* and *Helianthus*. Recorded by Robertson (1929) on *Rudbeckia* and *Verbena*.

The recognition of three other subspecies in the West necessitates this subspecific designation of the typical form of *helianthi*.

Triepeolus junctus new species

FEMALE—Length 10 mm.; black, mandibles dull ferruginous toward base, tegulae, tibiae and tarsi testaceous, femora testaceous in part but with blackened areas, mid and hind spurs blackish; median segments of flagellum somewhat longer than broad, piceous beneath, blackish above, basal segment reddened, slightly shorter than segment 2; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about one third width of eyes, considerably narrower below, hind margin carinate; median length of labrum about half the breadth, apical margin with a pair of acute denticles and a more minute median denticle; posterior margin of scutellum quite strongly outcurved, rather broadly and deeply impressed medially, free part of axillae quite strongly diverging from sides of scutellum, narrowly produced and acute, tips reaching slightly beyond mid transverse line of scutellum (similar to *4-fasciatus*, fig. 112); wings subhyaline basally, becoming faintly infuscated along outer margin, with the usual three submarginal cells, veins piceous; median area of face around antennae rather extensively whitish tomentose, clypeus covered with very short and thin but evident pale tomentum, cheeks also whitish tomentose, face above covered with more erect, pale hairs, vertex largely bare; margin of pronotum quite densely pale yellowish tomentose, tubercles with a narrow fringe; scutum with a pair of submedian, elongate, tomentose patches that are broad anteriorly, acuminate posteriorly, reaching slightly beyond the mid transverse line, lateral margins and scutello-mesothoracic suture also yellowish tomentose; metanotum and adjacent margin of scutellum densely pale tomentose, with a tuft of elongate pale hairs on each side just back of wing bases; posterior surface of propodeum thinly pale tomentose except in region of triangle, becoming quite dense at lateral margins; pleura anteriorly and above densely pale tomentose; basal abdominal tergum with a broad, transverse, black tomentose patch delimited basally by extensive yellow tomentose areas on each side of midline, and apically by a complete, yellowish tomentose fascia which is constricted but not interrupted medially, these rather broadly united at extreme sides; tergum 2 with a subapical, pale tomentose fascia and oblique lateral patches of tomentum extending from fascia to the basal margin; terga 3 and 4 with apical tomentose fasciae, that on 3 slightly separated from rim, and tergum 5 densely pale tomentose on each side of pseudopygidium; tegulae very finely and closely punctate on inner side, becoming rather narrowly impunctate on outer rim; punctures of face above antennae coarse, deep and distinct, quite close except in a limited area between eyes and ocelli where there are some shining interspaces evident, vertex and cheeks otherwise closely and more finely but distinctly punctate; face below antennae with very fine, uniformly close punctures; scutum quite coarsely and closely punctate throughout, with a few irregular and very narrow shining interspaces evident; scutellum somewhat more closely punctate, punctures of axillae somewhat finer and irregular; those of pleura below quite coarse, deep and distinct, with some shining interspaces evident, becoming somewhat closer but still distinct below, fine and rather densely crowded above where they are largely obscured by tomentum; punctures of abdominal terga beneath the black tomentum very fine and close throughout, becoming somewhat more deep and distinct but still fine and close on the more apical terga; pseudopygidium abruptly truncate apically, median length about two thirds the breadth, quite densely covered with short, suberect, pale setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in most characters, but depressed, apical, tomentose margins of terga 3-6 quite strongly yellowish, sterna 4 and 5 with subapical fringes of elongate, slightly curved, pale setae; pygidial plate strongly elevated above disc of tergum 7, transverse ridge very indefinite, apical portion beyond this rather narrowly rounded, slightly longer than broad, margin carinate.

TYPES—Holotype: Female, Lakeview, Moore Co., N. C., Sept. 23, 1933. Allotype: Raleigh, N. C., Late Sept., 1921 (both Mitchell) [author's coll.]. Paratypes: 1 ♀, savanna at Burgaw, N. C., Oct. 13, 1954 (Mitchell); 1 ♀, Fayetteville, N. C., Oct. 2, 1941 (H. E. Evans); 1 ♀, Riverhead,

Long Is., N. Y., Oct. 2, 1953 (Roy Latham).

Paratypes are in collections of the U. S. National Museum, Cornell University and the author.

Triepeolus lunatus lunatus (Say)

(Fig. 112)

Epeolus lunatus Say, 1824. In Keating, Narr. Long's 2nd Exped., v. 2, p. 354. ♀ ♂.
Epeolus lunatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 394. ♀ ♂.
Epeolus lunatus Brues, 1903. Ent. News 14, pp. 79, 80. ♀ ♂. (key)
Triepeolus lunatus Robertson, 1903. Canad. Ent. 35, pp. 284, 286. ♀ ♂. (key)
Triepeolus lunatus Cockerell, 1907. Ann. Mag. Nat. Hist. (7) 20, p. 62. ♀. (key)
Triepeolus lunatus Cockerell, 1921. Amer. Mus. Novitates 23, pp. 2, 14. (key)
Triepeolus lunatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12 mm.; black, labrum, mandibles, legs, tubercles, tegulae and basal segments of antennae ferruginous; segments of flagellum beyond first considerably longer than broad, piceous below, more blackish above; spurs brownish-testaceous; cheeks about one-third width of eye, becoming somewhat narrower below, posterior margin carinate; space between margin of vertex and lateral ocelli somewhat less than their diameter; median length of labrum slightly less than two-thirds the breadth; posterior margin of scutellum strongly outcurved, shallowly depressed medially, free part of axillae quite short, tips barely reaching mid transverse line of scutellum (fig. 112); wings lightly infuscated, somewhat darker apically, with the usual three submarginal cells, veins piceous; face with some yellowish, appressed pubescence around bases of antennae, and some more erect and elongate hairs below ocelli; otherwise pubescence of head very thin and inconspicuous; dorsal surface of pronotum densely yellowish tomentose, tubercles with a quite dense fringe, pleura with a transverse, elongate patch at upper third, and margin adjacent to tubercles yellowish tomentose; scutum with a pair of small, elongate spots just anterior to mid transverse line, and with a small spot of yellowish tomentum on each extreme side adjacent to tegulae, the metanotum and adjacent margin of scutellum densely yellowish tomentose, and triangular dorsal area of propodeum with a narrow fringe of more whitish tomentum; basal abdominal tergum with a median, triangular patch of black tomentum which separates the rather extensive lateral areas of yellow tomentum, apical band rather widely interrupted medially and somewhat separated from rim of the plate; terga 2-4 with apical tomentose fasciae which are slightly separated from rims, that on 2 slightly interrupted medially; tergum 5 with greyish-white tomentum on each side of the extensive pseudopygidium which is about as long medially as the apical width, rather sparsely set with fine setae; sternum 5 convex; punctures of face above antennae and on cheeks, deep and distinct but rather fine and close, becoming minute and densely crowded below antennae, clypeus doubly punctate, with some some scattered, coarse but rather shallow punctures on the minutely, densely punctate field; scutum densely but rather shallowly rugosopunctate; punctures of scutellum and axillae somewhat finer; pleura below shining between rather deep and distinct, slightly separated punctures; abdominal terga extremely minutely and densely punctate beneath dense, black tomentum of discs.

MALE—Answers in general to description of female; sterna 4 and 5 with apical fringes of curved setae; pygidial plate strongly elevated above surface of tergum 7, apical portion beyond transverse ridge slightly longer than broad, quite smooth, margin carinate; terga 2-6 with subapical fasciae, slightly interrupted on 2 and 3 and rather widely separated from rims, more nearly apical on the following terga and more whitish in color.

DISTRIBUTION—Minnesota to the New England states, south to Texas and Florida; May to September.

FLOWER RECORDS—*Helianthus, Melilotus, Phaseolus* and *Pycnanthemum*. Recorded by Robertson (1929) on *Bidens, Cephalanthus, Coreopsis, Eryngium, Eupatorium, Heliopsis, Lepachys, Lippia, Petalostemum, Silphium* and *Verbena*.

Triepeolus lunatus concolor (Robertson)

Epeolus lunatus var. *concolor* Robertson, 1898. Acad. Sci. St. Louis, Trans. 8, p. 52.
Triepeolus concolor Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)
Triepeolus concolor Cockerell, 1921. Amer. Mus. Novitates 23, p. 14. (key)
Triepeolus concolor Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

This form is separable from typical *lunatus* only in color, and the fact that a relatively high proportion of specimens shows

an intermediate condition in this regard indicates that the two are only subspecifically distinct if at all. In both sexes of typical *concolor* the antennae, labrum, mandibles, legs and tubercles are entirely black, and the tegulae only slightly reddened along outer margin. Intermediates have varying degrees of redness on these parts.

DISTRIBUTION — Minnesota to Pennsylvania, south to Texas and Florida; May to September.

FLOWER RECORDS—*Helenium, Melilotus, Paspalum, Phaseolus, Pycnanthemum* and *Solidago*. This subspecies is recorded by Robertson (1929) on *Asclepias, Aster, Bidens, Blephilia, Cephalanthus, Cirsium, Helianthus, Heliopsis, Lepachys, Liatris, Lippia, Lycopus, Lythrum, Monarda, Nepta, Petalostemum, Rudbeckia, Silphium, Teucrium* and *Verbena*.

HOST—Leland Chandler at Purdue University states in correspondance that *Melissodes bimaculata* is the host of *concolor*.

Triepeolus michiganensis new species

FEMALE—Length 8 mm.; black, mandibles ferruginous, blackened at tips, tegulae testaceous, tarsi brownish-testaceous, tibiae testaceous with piceous infusions, femora and mid and hind spurs largely piceous, tubercles black; basal segment of flagellum much shorter than segment 2 which is considerably longer than broad, following segments piceous beneath, black above; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks about half width of eyes, somewhat narrower below, hind margin subcarinate; median length of labrum slightly greater than half the breadth, with a pair of small, apical, submedian denticles; posterior margin of scutellum strongly outcurved, with a rather deep median impression, free part of axillae quite short, tips just reaching mid transverse line of scutellum (similar to *cressonii*, fig. 112); wings very lightly infuscated basally, becoming somewhat more deeply so apically, with the usual three submarginal cells, veins testaceous to piceous; face with a small amount of appressed silvery tomentum around bases of antennae, with more erect but quite thin, pale pubescence above; margin of pronotum quite densely whitish tomentose, tubercles with a marginal fringe, scutum with a pair of narrow, elongate lines of pale tomentum anteriorly, sparsely fringed with the same laterally and in scutello-mesothoracic suture; anterior face of pleura above quite densely pale tomentose, and with a narrow, transverse, tomentose line to the mid coxae; metanotum and adjacent margin of scutellum quite densely whitish tomentose, terminating laterally in a tuft of elongate, whitish hairs back of wing bases; basal abdominal tergum whitish tomentose across anterior face, this slightly interrupted medially, with an apical tomentose fascia, median black tomentose patch broadly quadrangular, the basal and apical tomentose areas narrowly united at extreme sides, the apical fascia narrowly interrupted medially and slightly separated from rim of the tergum; terga 2-4 with transverse, apical, tomentose fasciae, but slightly interrupted, if at all on 2, slightly separated from the yellowish rims on 2 and 3, tergum 2 with a narrow whitish tomentose patch on each extreme side reaching from the fascia nearly to the base; tergum 5 with a triangular patch of whitish tomentum on each side of pseudopygidium; punctures of tegulae fine and quite close on inner margin, becoming narrowly impunctate on outer rims; punctures of face above antennae very coarse, deep and quite close but not crowded, becoming somewhat finer and more densely crowded across vertex and on cheeks, densely and finely punctate below antennae, clypeus with a median, impunctate line from base to center, surface with scattered, shallow, rather coarse punctures superimposed on the finely punctate field; scutum, scutellum and axillae quite coarsely, closely, deeply and evenly punctate, the punctures almost crowded; pleura below with some irregular shining spaces, the punctures becoming densely crowded toward the tomentose patch above, the area above this patch and below wing bases very coarsely, deeply and distinctly punctate; discs of abdominal terga beneath the black tomentum with close, fine, evenly distributed punctures, becoming slightly finer, closer and deeper on tergum 5; pseudopygidium about as long as its apical width, broadly rounded apically, covered with short, fine, suberect, brownish setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in most respects, but segments of flagellum shorter, length about equal to breadth; legs somewhat darker, with only the tarsi definitely testaceous; terga 5 and 6 with transverse, apical, pale tomentose fasciae, that on 6 rather short; pygidial area strongly elevated above disc of tergum 7, carinate laterally, apical area beyond transverse ridge slightly longer than broad, surface with a few shallow, irregular and obscure pits.

TYPES — Holotype: Female, Shiwassee Co., Mich., Sept. 3, 1950 (R. R. Dreisbach) [author's coll.]. Allotype: Colebrook, Conn., July 28, 1921 (W. M. Wheeler) [M.C.Z.]. Paratypes: 1 ♂, Colebrook, Aug. 8, 1922 (Wheeler) [M.C.Z.]; 1 ♂, Wild Flower Preserve, Slaterville, N. Y., July 26, 1931 [Cornell Univ.].

Triepeolus micropygius atripes new subspecies

(Fig. 112)

FEMALE—Length 10 mm.; entirely black, including antennae, tubercles, tegulae, legs and spurs; space between margin of vertex and lateral ocelli considerably less than their diameter; basal segment of flagellum considerably shorter than segment 2, median segments considerably longer than broad; cheeks very narrow, little more than one-third width of eye, somewhat more narrowed below, posterior margin carinate; median length of labrum nearly two-thirds the breadth, apical margin with a pair of minute, submedian denticles; posterior margin of scutellum quite strongly outcurved, broadly impressed medially, free part of axillae extending considerably from sides of scutellum, reaching somewhat beyond mid transverse line (fig. 112); wings lightly infuscated, with the usual three submarginal cells, veins piceous; face with a small amount of silvery tomentum between bases of antennae and eyes, pubescence otherwise rather short, thin and erect, but practically absent from lower part of face; margin of pronotum with rather dense whitish tomentum, and tubercles with a similar fringe; pleura with a narrow, transverse patch of white tomentum above; scutum with a pair of narrow, longitudinal lines of white tomentum toward anterior margin medially, lateral margins narrowly fringed, and scutellomesothoracic suture with some very short, inconspicuous, whitish hairs; metanotum and adjacent margin of scutellum rather densely whitish fasciate, with a tuft of elongate, white hairs on each end behind wing bases; propodeum rather thinly white fasciate along margins of basal triangle and at extreme sides above; basal abdominal tergum with a median, transverse patch of black tomentum, this bordered basally by whitish tomentum, and apical margin with a whitish fascia which is slightly interrupted medially and narrowly joined to the basal tomentum on each extreme side; terga 2-4 with apical, transverse, tomentose fasciae, and tergum 2 with a quadrangular patch of pale tomentum on each extreme side, joining the apical fascia which is subinterrupted medially; tergum 5 with a triangular patch of short pale tomentum on each side of pseudopygidium; tegulae minutely and closely punctate on inner margins, becoming impunctate along outer rim; punctures of face above antennae quite deep and distinct but rather fine and close, becoming somewhat finer and quite regular on cheeks below, face below antennae very densely and minutely rugoso-punctate, clypeus with an indefinite, median, shining line; scutum rather coarsely rugoso-punctate, with only scattered, indefinite, shining interspaces evident between punctures, scutellum and axillae somewhat more rugose; pleura below shining between rather coarse, deep and distinct punctures which are slightly but not widely separated, becoming quite densely rugoso-punctate above; discs of abdominal terga very finely, closely and regularly punctate beneath the black tomentum; median length of pseudopygidium about equal to the width, very broadly rounded or subtruncate apically, apical half covered with short, erect bristles, basal half with dense, pale yellowish tomentum, the two areas in sharp contrast; sternum 5 broadly convex as seen from beneath.

MALE—Resembles female in most details; venter of thorax with considerable dense, appressed, whitish tomentum; outer surface of tibiae quite densely white tomentose; segments of flagellum somewhat shorter, not much longer than broad; abdominal terga 5 and 6 with dense, whitish, apical fasciae; sterna 4 and 5 with subapical fringes of long, curved setae; pygidial plate strongly elevated above disc of tergum 7, apical part beyond transverse ridge somewhat triangular, with narrowly rounded apex, margin subcarinate, surface with a few shallow, obscure pits, the more basal area densely fine tomentose.

TYPES—Holotype: Female, Holly Shelter, Pender Co., N. C., Oct. 18, 1952. Allotype: Savanna at Burgaw, N. C., Oct. 23, 1957, on *Helianthus* (both Mitchell). Paratypes: 2 ♀♀, topotypical; 1 ♀, Sampson Co., N. C., Nov. 4, 1957 (on *Aster*); 1 ♀, Clayton, N. C., Oct. 4, 1959; 1 ♂, Southern Pines, N. C., Sep. 30, 1951 (on *Aster*) (all Mitchell) [all author's coll.]; 1 ♀, Demarest, Ga., Sep. 20, 1921 [Cornell Univ.]; 1 ♀, Colerain Park, Pa., Sep. 5, 1954 (S. W. Frost).

Triepeolus micropygius micropygius Robertson

Triepeolus micropygius Robertson, 1903. Canad. Ent. 35, p. 286. ♀.

Triepeolus micropygius Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—This agrees in all essential details of structure with the subspecies *atripes*, differing only in color and pubescence as follows: All coxae black, but trochanters and following segments of legs bright ferruginous; tomentose bands and spots of thorax and abdomen yellowish, the transverse, abdominal bands nearly twice as broad; and tegulae more reddish; wings and pseudopygidium similar to *atripes*.

DISTRIBUTION—Illinois.

FLOWER RECORDS — Robertson (1929) records this species only on *Aster ericoides villosus*.

There is some evidence of intergradation between these two forms, with one specimen from Pennsylvania at hand in which the legs, mandibles, and to a lesser degree the antennal scape are somewhat reddened.

Triepeolus monardae new species
(Fig. 112)

MALE—Length 16 mm.; mandibles and apical tarsal segments somewhat reddish, otherwise entirely black; basal segment of flagellum considerably shorter than segment 2, median segments slightly longer than broad; space between margin of vertex and lateral ocelli much less than their diameter; cheeks very narrow, little more than one third width of eyes, still narrower below, posterior margin subcarinate; median length of labrum about half the breadth, with a pair of minute, subapical denticles medially; posterior margin of scutellum broadly outcurved, deeply impressed medially, free part of axillae robust and elongate, nearly attaining posterior transverse line of scutellum (fig. 112); wings lightly infuscated, with the usual three submarginal cells, veins piceous; face below antennae quite densely silvery tomentose, more thinly so across apical half of clypeus, face above with more elongate, erect and rather thin pubescence; cheeks very finely and rather thinly whitish tomentose; margin of pronotum densely pale yellowish tomentose, this continuing around tubercles, upper half of pleura quite densely yellowish tomentose; scutum with a pair of anterior, elongate patches of yellowish tomentum reaching slightly beyond mid point on each side of midline; lateral margins of scutum, scutellomesothoracic suture, metanotum and adjacent posterior face of scutellum densely pale yellowish tomentose, with a quite dense tuft of elongate pale hairs on each side posterior to wing bases; posterior face of propodeum quite densely pale tomentose, especially above and laterally, triangle largely bare; anterior face of basal abdominal tergum largely pale yellowish tomentose, and with a subapical fascia, these rather broadly united laterally, the fascia slightly interrupted medially and slightly removed from apical rim, the resulting black tomentose patch very broadly transverse; tergum 2 with a broad, subapical, yellowish fascia and with a quite large patch of yellowish tomentum on each extreme side that extends from the fascia to the base; terga 3-5 with subapical, transverse fasciae which are rather widely removed from apical rims, 6 with an apical fascia; tegulae minutely and very closely but distinctly punctate throughout; punctures of face below ocelli deep, distinct and rather coarse but quite close, rather sparse laterad of each lateral ocellus, finer and quite close across vertex, fine and slightly separated on cheeks; punctures of scutum deep and distinct but rather fine and close, slightly separated near midline over posterior half; scutellum and axillae densely and finely rugoso-punctate, quite dull; pleura below rather irregularly and closely punctate, but with a few narrow, shining interspaces evident, becoming densely and more finely rugose above, beneath pale tomentum; punctures of discs of abdominal terga beneath the black tomentum very minute and close, quite uniform; sterna 2 and 3 quite conspicuously whitish fasciate apically, 4 and 5 with subapical fringes of elongate, apically curved, brownish hairs; pygidial plate strongly elevated above disc of tergum 7, with a rather conspicuous, submedian, transverse ridge, apical part beyond ridge about as broad as long, broadly rounded, margin carinate, surface rather smooth, the more basal area densely and finely rugose.

TYPES — Holotype: Male, Wilmington, N. C., Sept. 12, 1932 (Mitchell) [author's collection]. Paratypes: 2 ♂♂, Bogue, Cartaret Co., N. C., Aug. 30 & 31, 1933 (Mitchell, on *Monarda punctata*).

Triepeolus nevadensis (Cresson)
(Fig. 112)

Epeolus nevadensis Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 86. ♀.

Triepeolus Nevadensis Robertson, 1903. Canad. Ent. 35, pp .285, 286. ♀ ♂. (key)

Triepeolus nevadensis Robertson, 1929. Flowers and Insects, Lancaster, Pa.. Science Press. (flower records)

FEMALE—Length 13-15 mm.; entirely black, including legs, tubercles, tegulae and labrum, the mandibles slightly reddened; basal segment of flagellum somewhat reddened, median segments somewhat longer than broad; space separating lateral ocelli from margin

of vertex slightly less than their diameter; cheeks very narrow, less than half width of eyes, still narrower below, posterior margin carinate; median length of labrum about two-thirds the breadth, with a pair of minute and obscure apical denticles; posterior margin of scutellum broadly outcurved, very slightly depressed medially, free part of axillae hardly evident, joined for nearly entire length to sides of scutellum, tips not reaching mid transverse line (fig. 112); wings subhyaline basally, becoming lightly infuscated apically, with the usual three submarginal cells, veins brownish to piceous; face with no appressed pale tomentum but with some suberect, rather copious black pubescence just above antennae, which is in part yellowish; margin of pronotum, entire tubercles, adjacent upper part of pleura, and narrow margin encircling central disc of scutum, yellow tomentose; metanotum and adjacent margin of scutellum densely pale yellow tomentose, with tufts of elongate yellowish pubescence at each extreme side just back of wing bases; posterior face of propodeum with a pale tomentose area on each side above; pleura below densely black tomentose, partially obscuring the surface; basal abdominal tergum with a rather narrow, quadrangular, black tomentose patch which is bordered on each side and apically with dense yellow tomentum, apical band rather narrow, somewhat removed from rim of tergum, lateral areas very broad, the basal tomentum widely interrupted medially; tergum 2 with a transverse, subapical, yellow tomentose band which is abruptly broadened on each extreme side, nearly attaining basal margin; terga 3 and 4 with transverse, tomentose bands, that on 3 somewhat removed from margin, that on 4 somewhat less so, 5 with rather restricted, oblique, pale tomentose areas on each side of pseudopygidium; face between antennae and ocelli with deep, distinct, rather sparse punctures in part, these becoming close toward antennae, very fine and close across vertex and on cheeks; face below antennae shining, only microscopically punctate, but with scattered, rather coarse and deep punctures over clypeus and supraclypeal area; scutum shining beneath blackish tomentum, punctures minute and slightly but not widely separated; scutellum very closely and finely punctate, surface densely black tomentose, and axillae minutely and closely punctate; pleura very finely and densely punctate throughout; punctures of abdominal terga minute and densely crowded throughout, largely obscured by black tomentum; pseudopygidium rather broadly rounded apically, basal margin indefinite, median length only slightly more than half the breadth, surface somewhat shining, covered with suberect, fine, blackish bristles; sternum 5 broadly convex as seen from beneath.

MALE—Answers in general to description of female, but with a small patch of conspicuous yellowish tomentum on each side of face between antennae and eyes; scutellum more deeply grooved medially; tergum 5 with an apical, transverse, tomentose fascia, but tergum 6 completely black; sternum 3 with a quite conspicuous, transverse, white fascia which is slightly interrupted medially, sterna 4 and 5 with subapical fringes of elongate, apically flexed, black setae; pygidial plate strongly elevated above disc of tergum 7, median length beyond transverse ridge somewhat greater than breadth at that point, margin carinate, rather narrowly rounded, surface with a few shallow and obscure pits, the more basal area minutely punctate and with subappressed tomentum.

DISTRIBUTION—Nebraska and Texas to North Carolina and Georgia; June to September. Flower records by Robertson suggest the probability that he collected *nevadensis* in Illinois.

FLOWER RECORDS — *Vernonia.* Robertson's (1929) list includes *Cirsium, Helianthus, Monarda, Pycnanthemum* and *Verbena.*

Triepeolus nigrihirtus new species

MALE—Length 9 mm.; legs and mandibles slightly reddened, otherwise entirely black; (segments of flagella beyond basal segment missing); space between margin of vertex and lateral ocelli considerably greater than their diameter; cheeks about half width of eyes, somewhat narrower below, posterior margin carinate; median length of labrum about equal to half the breadth, median apical denticles exceedingly minute, barely evident; posterior margin of scutellum broadly outcurved, quite deeply impressed medially, free part of axillae short but rather strongly divergent from sides of scutellum, tips not reaching mid transverse line (similar to *cressonii*, fig. 112); wings rather lightly infuscated, with the usual three submarginal cells, veins testaceous to piceous; head entirely without appressed tomentum, but face around and above antennae with considerable elongate and erect pale pubescence; pronotum with considerable erect pale pubescence, margin very narrowly bordered with sub-appressed tomentum, and a quite dense fringe of tomentum around tubercles; pleura above partially covered with subappressed tomentum; anterior half of scutum covered with rather thin, short, erect, pale pubescence, posterior half with

somewhat shorter and more dense black pubescence, lateral and posterior margins fringed with subappressed, whitish tomentum; metanotum thinly pubescent, but not at all tomentose, and adjacent surface of scutellum with suberect, pale pubescence; posterior face of propodeum rather densely whitish tomentose on each side of the shining triangle; anterior face of basal abdominal tergum densely whitish tomentose, apical margin with a complete, quite dense, transverse fascia, these narrowly united at each extreme side, the resulting black tomentose patch broadly transverse, narrowed at each side; tergum 2 with a broad, transverse, apical fascia and a somewhat triangular patch at each side, apex of triangle uniting narrowly with the fascia; terga 3-6 with broad, dense fasciae occupying the depressed apical margins which are yellowish-hyaline on the more apical terga; tegulae minutely, closely and uniformly punctate throughout; punctures of face below ocelli quite coarse, deep and distinct, quite close but with very narrow shining spaces evident, becoming quite sparse between ocelli and eyes, closer back of ocelli, and quite close, deep and distinct on cheeks and on face below antennae, becoming somewhat finer and closer toward apical margin of clypeus; scutum quite deeply, coarsely and uniformly closely punctate throughout, punctures almost crowded, those on scutellum somewhat finer but distinct and deep, those on axillae very fine and rather indefinite; pleura below with rather coarse, irregular punctures, with some irregular shining interspaces evident, becoming densely rugose above beneath the loose tomentum; discs of abdominal terga very minutely, closely and uniformly punctate throughout beneath dense black tomentum; pygidial plate rather narrow and elongate, somewhat triangular, with narrowly rounded apex, the transverse ridge obscure, margin carinate, surface quite smooth; sterna 4 and 5 with subapical fringes of curved, rather elongate, pale hairs.

TYPE — Holotype: Male, Merry Oaks, Chatham Co., N. C., May 27, 1926 (Mitchell) [author's coll.].

Triepeolus obliteratus Graenicher

Triepeolus obliteratus Graenicher, 1911. Pub. Mus. City Milwaukee, Bul. 1. p. 242. ♀ ♂.

FEMALE—Length 9 mm.; black, tegulae and tarsal segments testaceous, tibiae and femora testaceous in part, with dark infusions, mandibles dull ferruginous, antennal scape somewhat reddened apically, the tubercles entirely black; lateral ocelli separated from margin of vertex by about half their diameter; cheeks about half width of eyes, rather strongly narrowed below, posterior margin carinate; segments of antennae only slightly longer than broad, segment 2 slightly longer than 1; median length of labrum slightly more than half the breadth, with a pair of subapical, carinate denticles; posterior margin of scutellum rather strongly rounded, quite deeply impressed medially, free part of axillae quite short, acute, reaching slightly beyond mid transverse line of scutellum (similar to *lunatus*, fig. 112); wings hyaline basally, lightly infuscated apically, veins brownish-testaceous, transverse cubitus incomplete, thus with only two submarginal cells; face with considerable pale tomentum, rather dense between antennae and eyes, very short but evident on clypeus, largely hiding surface, and rather dense on cheeks; margin of pronotum quite densely pale tomentose, tubercles with a similar fringe, and upper adjacent area of pleura quite densely whitish tomentose; scutum with a pair of elongate patches of pale tomentum on each side of mid-line anteriorly, lateral margins narrowly tomentose, continuing around the scutello-mesothoracic suture; metanotum and adjacent margin of scutellum rather thinly whitish tomentose, with a tuft of elongate white hairs at each end, posterior face of propodeum on each side of triangle rather thinly white tomentose; basal abdominal tergum with a broad, transverse, black tomentose area which is bordered anteriorly and posteriorly with dense whitish tomentum, these rather broadly joining at each extreme side; terga 2-4 with transverse, apical, tomentose fasciae, with oblique patches of pale tomentum on each extreme side of tergum 2 that join the apical fascia; tergum 5 with rather extensive areas of dense, whitish tomentum on each side of pseudopygidium; tegulae minutely and closely punctate on inner side, becoming impunctate along outer rim; upper part of face rather coarsely, deeply and closely punctate, the punctures somewhat finer and partially obscured on cheeks, very fine and largely obscured on lower part of face; scutum, scutellum and axillae densely rugoso-punctate; lower portion of pleura coarsely and rather irregularly punctate, with a few shining interspaces evident, punctures becoming densely crowded above; discs of abdominal terga very finely, closely and quite regularly punctate beneath the black tomentose areas; pseudopygidium abruptly truncate apically, apical width somewhat greater than median length, covered with very short, fine, suberect bristles; sternum 5 strongly convex as seen in ventral view, somewhat narrowed apically.

MALE—Answers in general to description of female, but labrum, mandibles, tubercles

tegulae and legs rather bright testaceous; scutellum somewhat more deeply grooved medially; terga 5 and 6 with conspicuous, whitish, apical, tomentose fasciae; sterna 4 and 5 with subapical fringes of elongate, somewhat curved bristles; pygidial plate strongly elevated above disc of tergum 7, apical part somewhat narrowed and elongate, rather broadly rounded, margins carinate, and surface with a few shallow, obscure punctures.

DISTRIBUTION—Wisconsin.

Triepeolus pectoralis (Robertson)
(Fig. 112)

Epeolus pectoralis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 345. ♀.
Triepeolus pectoralis Robertson, 1903. Canad. Ent. 35, p. 285. ♀. (key)
Triepeolus pectoralis Lovell and Cockerell, 1905. Psyche 12, p. 42. ♂.
Epeolus virginiensis Cockerell, 1907. Entomologist 40, p. 137. ♂. New synonymy
Triepeolus pectoralis Cockerell, 1921. Amer. Mus. Novitates 23, p. 15. (key)
Triepeolus pectoralis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 10 mm.; black, including tubercles, tegulae and labrum, the legs bright testaceous, mid and hind spurs piceous, mandibles somewhat reddened; median segments of flagellum somewhat longer than broad, basal segment more ferruginous, distinctly shorter than segment 2, following segments piceous beneath, blackish above; space between margin of vertex and lateral ocelli much narrower than their diameter; cheeks sightly less than half width of eyes, still narrower below, hind margin subcarinate; median length of labrum about half the breadth, apical margin with a pair of quite distinct, submedian tenticles; posterior margin of scutellum broadly outcurved, shallowly impressed medially, free part of axillae somewhat divergent from sides of scutellum but rather short, reaching slightly beyond mid transverse line (fig. 112); wings subhyaline basally, becoming faintly infuscated apically, with the usual three submarginal cells, veins brownish to piceous; face with some dense, appressed, whitish tomentum around bases of antennae, over supraclypeal area, and more thinly on clypeus and cheeks, face above with more erect, elongate, pale hairs, vertex largely bare; margin of pronotum, a pair of narrow, parallel, anterior lines on scutum, and lateral margins and scutello-mesothoracic suture of scutum, with dense yellowish tomentum; tubercles somewhat more whitish tomentose and with a quite dense marginal fringe, pleura with some dense pale tomentum above, but area just below tegulae somewhat more thinly tomentose; metanotum and adjacent margin of scutellum densely pale yellowish tomentose, with tufts of elongate pale hairs on each extreme side behind wing bases; upper lateral areas of posterior face of propodeum densely whitish tomentose; basal abdominal tergum with a broad, transverse patch of black tomentum, anterior face and posterior margin densely yellow tomentose, these areas rather narrowly joined at each extreme side and slightly interrupted medially; tergum 2 with a transverse fascia which is slightly removed from rim near mid point, and with a pair of slightly oblique patches of pale tomentum on each extreme side, reaching from fascia to basal margin; terga 3 and 4 with dense. appressed, pale yellowish, apical fasciae; tergum 5 more greyish tomentose on each side of pseudopygidium; punctures of tegulae deep and distinct but fine and close, becoming narrowly impunctate along outer rim; punctures of face above antennae coarse, deep, distinct and quite close, becoming finer and densely crowded across vertex and on cheeks, face below antennae minutely and very closely punctate, and clypeus with scattered, shallow, somewhat coarser punctures; scutum rather finely rugoso-punctate throughout, the scutellum and axillae more finely and densely rugoso-puncate; pleura below shining, with rather fine, scattered, widely separated punctures, becoming densely rugoso-punctate above; punctures of abdominal terga very fine, uniform, densely crowded throughout beneath black tomentum; pseudopygidium rather narrow, slightly longer than broad, apical margin rather broadly rounded, covered with short, suberect, rather fine, pale setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in many characters, but face more densely and completely silvery tomentose, mesopleura laterally and beneath densely silvery tomentose, completely hiding the surface; sterna 2 and 3 with broad. white, apical, tomentose fasciae, 4 with a submarginal fringe of elongate, apically curved but rather fine setae, the much narrower fringe on 5 of shorter hairs; tergum 5 with an apical, dense, pale yellowish fascia, that on 6 hardly evident; pygidial plate strongly elevated above disc of tergum 7, apical part beyond transverse ridge slightly longer than broad, evenly rounded, margin carinate, surface quite smooth.

DISTRIBUTION — Minnesota to the New England states, south to Georgia; August to November.

FLOWER RECORDS—*Aster, Haplopappus* and *Polygala*. Robertson (1929) records *pectoralis* on *Bidens, Boltonia, Eupatorium, Rudbeckia, Solidago* and *Verbena*.

HOST—This species has been collected at nesting sites of *Melissodes rustica*.

Triepeolus 4-fasciatus atlanticus new subspecies

(Fig. 112)

FEMALE—Length 13 mm.; black, labrum, mandibles except tips, tegulae, tubercles in large part, and entire legs, ferruginous, mid and hind spurs black; scape, pedicel, and segment 1 of flagellum ferruginous, flagellum otherwise piceous beneath, black above, segments considerably longer than broad; space between margin of vertex and lateral ocelli somewhat less than their diameter; cheeks slightly less than half width of eyes, somewhat narrower below, posterior margin subcarinate; median length of labrum fully two thirds the breadth, apical margin with a pair of minute, submedian denticles; posterior margin of scutellum strongly outcurved, quite deeply impressed medially, free part of axillae strongly divergent from sides of scutellum, narrow and elongate, tips nearly attaining posterior transverse line of scutellum (fig. 112); wings rather uniformly lightly infuscated, with the usual three submarginal cells, veins piceous; face with a small amount of short, appressed, pale tomentum around bases of antennae, with more erect and elongate hairs above and between antennae, surface otherwise largely bare; dorsal surface of pronotum quite broadly and densely yellow tomentose, tubercles with a slightly more whitish marginal fringe, adjacent area of pleura quite densely pale yellowish tomentose; scutum with a small patch of yellowish tomentum on each lateral posterior angle and a small amount in the scutello-mesothoracic suture, otherwise entirely black; metanotum and adjacent margin of scutellum pale yellowish tomentose, with some elongate, yellowish hairs at extreme lateral angles posterior to wings bases; posterior face of propodeum above, laterad of triangle, quite densely whitish tomentose; basal abdominal tergum largely yellowish tomentose, but with a narrow, median area of black, and apical margin narrowly black, with the black tomentose patch quite strongly, triangularly broadened medially; terga 2-4 with dense, transverse, pale yellowish to whitish fasciae, the discs black tomentose, and rims narrowly black; tergum 5 with a rather broad, oblique area of whitish tomentum on each side of pseudopygidium; tegulae minutely and very closely punctate in large part, becoming narrowly impunctate along lateral and posterior margins; punctures of face below ocelli deep and distinct, but rather fine and close, becoming somewhat more widely separated between ocelli and eyes, slightly separated and distinct on cheeks, rather close, fine and irregular across vertex; face below antennae more minutely punctate, punctures very close on supraclypeal area, slightly separated on shining clypeus which has scattered, shallow but coarse punctures in addition; scutum somewhat shining between rather fine, slightly separated punctures over most of disc, becoming densely punctate along anterior margin; scutellum dull, finely and densely punctate except for some rather indefinite interspaces evident on each side of median depression, axillae very minutely and closely punctate apically, but punctures more distinct toward base; pleura shining between deep, distinct, moderately coarse and slightly separated punctures, these becoming finer and densely crowded above; discs of abdominal terga minutely and very closely and regularly punctate throughout, punctures becoming somewhat more distinct but still very close on terga 4 and 5; pseudopygidium very broadly rounded, almost truncate apically, median length about equal to apical width, covered with short, suberect, dark setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female in most characters; pleura somewhat more closely punctate and tubercles more definitely ferruginous; abdominal terga 5 and 6 with dense, apical, transverse, white fasciae; sterna 4 and 5 with subapical fringes of elongate, apically curved, brownish or piceous hairs; pygidial plate strongly elevated above disc of tergum 7, the transverse ridge inevident, margin carinate, rather narrowly rounded apically, nearly parallel-sided, surface with shallow, obscure and irregular punctures, rather coarse across median area, minute on basal area which is black tomentose.

TYPES—Holotype: Female, Bogue, Carteret Co., N. C., Aug. 31, 1933. Allotype; topotypical (both Mitchell, on *Monarda punctata*). Paratypes: NORTH CAROLINA: 3 ♀♀, 1 ♂, topotypical; 4 ♀♀, 1 ♂ Bogue, Aug. 30, 1945; 2 ♀♀, Wilmington, Sept. 12, 1932; 3 ♀♀, 2 ♂♂, Southern Pines, Sept. 10 & 23, 1950. (on *Kuhnistera pinnata*); 2 ♂♂, Southern Pines, Aug. 24, 1951 and Sept. 11, 1959 (on *Kuhnistera pinnata*); 1 ♀, Holly Shelter Game Refuge, Pender Co., Sept. 5, 1958 (on *Chrysopsis*) (all Mitchell). GEORGIA: 1 ♂, Rome, Aug. 28, 1958 (Mitchell, on *Koellia*); 1 ♀, Albany, Sept. 1910; 1 ♀, Lavender, Floyd

Co., Aug. 23, 1910; 1 ♂, Bainbridge, Sept. 17-Oct. 19, 1910 (both J. C. Bradley); 2 ♂♂, Spring Creek, Decatur Co., Aug. 9-12, 1931 (Bradley & Knott); 1 ♀, Waynesville, Sept. 10, 1909. MARYLAND: 1 ♀ (J. Waugh). MISSOURI: 1 ♀, St. Louis, Sept. 7, 1937 (U.S.D.A. Traps—W. M. Gordon). FLORIDA: 3 ♀♀, Gainesville, Aug. 4 & 6, & Oct. 11, 1918 (P. W. Fattig); 3 ♂♂, Monticello, Aug. 16 (G. Fairchild); 1 ♀, Cocoa, July 1946 (G. E. Bohart); 2 ♂♂, Indian River, Wittfeld (Allen Eddy).

Paratypes are in collections of the Museum of Comparative Zoology, Cornell University, G. E. Bohart and the author.

Triepeolus remigatus (Fabricius)

(Fig. 112)

Melecta remigata Fabricius, 1804. Systema Piezatorum, p. 387.

Epeolus remigatus Cresson, 1864. Ent. Soc. Phila. Proc. 2, p. 393. ♀ ♂.

Epeolus remigatus Brues, 1903. Ent. News 14, p. 79. (key)

Triepeolus remigatus Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂. (key)

Triepeolus remigatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12-13 mm.; black, including tubercles, tegulae and legs, but tibiae and tarsi more or less brownish; basal segment of flagellum somewhat reddish, slightly shorter than segment 2, median segments somewhat longer than broad, piceous below, black above; space separating lateral ocelli from margin of vertex slightly less than their diameter; cheeks slightly less than half width of eyes, slightly narrower below, posterior margin subcarinate; median length of labrum somewhat greater than half the breadth, with a pair of apical, submedian denticles; posterior margin of scutellum strongly outcurved, broadly and shallowly impressed medially, free part of axillae rather strongly divergent from sides of scutellum, tips slightly exceeding mid transverse line of scutellum (fig. 112); wings subhyaline basally, becoming rather strongly infuscated apically, with the usual three submarginal cells, veins brownish to piceous; face with a few pale hairs intermixed with some fuscous pubescence just above antennae, head otherwise entirely black; pronotum dorsally, tubercles, adjacent L-shaped area of pleura, metanotum and adjacent margin of scutellum, and anterior, lateral and posterior margins of scutum, densely yellow tomentose; anterior band of scutum narrowly interrupted medially, quite broad on each side, lateral margins quite broadly tomentose, with the scutello-mesothoracic suture very narrowly tomentose, a pair of small tomentose spots on anterior margin of scutellum adjacent to the suture; disc of basal abdominal tergum largely yellowish tomentose, interrupted medially, forming a rounded or subtriangular median black tomentose area, anterior face black tomentose, and apical rim narrowly black; tergum 2 with a broad, dense, yellowish tomentose band which is very slightly interrupted medially, gradually broadened on each side to occupy nearly the entire lateral areas of the plate; terga 3 and 4 with entire, yellowish tomentose, subapical fasciae; tergum 5 with a small patch of greyish-white tomentum on each side of pseudopygidium; tegulae very minutely and closely punctate throughout; face above antennae with deep and distinct but rather fine and close punctures, these becoming fine and densely crowded on vertex, slightly more coarse and distinct, but still very fine on cheeks, face below antennae very finely and densely punctate, clypeus with shallow, scattered, somewhat coarser punctures superimposed on the finely punctate field; scutum with uniformly fine and very close punctures throughout, those on median portion of scutellum very minute and obscure, densely crowded, scutellum laterally and axillae more distinctly but very finely and closely punctate; punctures of pleura very fine and densely crowded; punctures of abdominal terga beneath the yellow or black tomentum extremely minute and densely crowded; median length of pseudopygidium barely equal to the breadth, very broadly rounded or subtruncate apically, covered with very fine, short and suberect, pale setae; sternum 5 broadly convex as seen from beneath.

MALE—Similar to female; terga 5 and 6 pale fasciate apically, that on 6 quite short; sterna 2 and 3 with apical, transverse, silvery tomentose fasciae that are quite narrow, 4 and 5 with rather dense, subapical fringes of elongate, apically curved setae; pygidial plate strongly elevated above disc of tergum 7, with a rather distinct, basal, transverse ridge, apical part slightly longer than broad, evenly rounded, margins carinate, surface with some very fine, obscure reticulations.

DISTRIBUTION — In the East, from Minnesota to New Jersey, south to Texas and Florida; May to September.

FLOWER RECORDS — *Helianthus* and *Pontederia*, as well as cultivated cucurbits (Canteloup, Cucumber and Squash). It is recorded by Robertson (1929) on the following: *Asclepias, Actinomeris, Bidens, Blephilia, Cirsium, Ipomoea, Lepachys,*

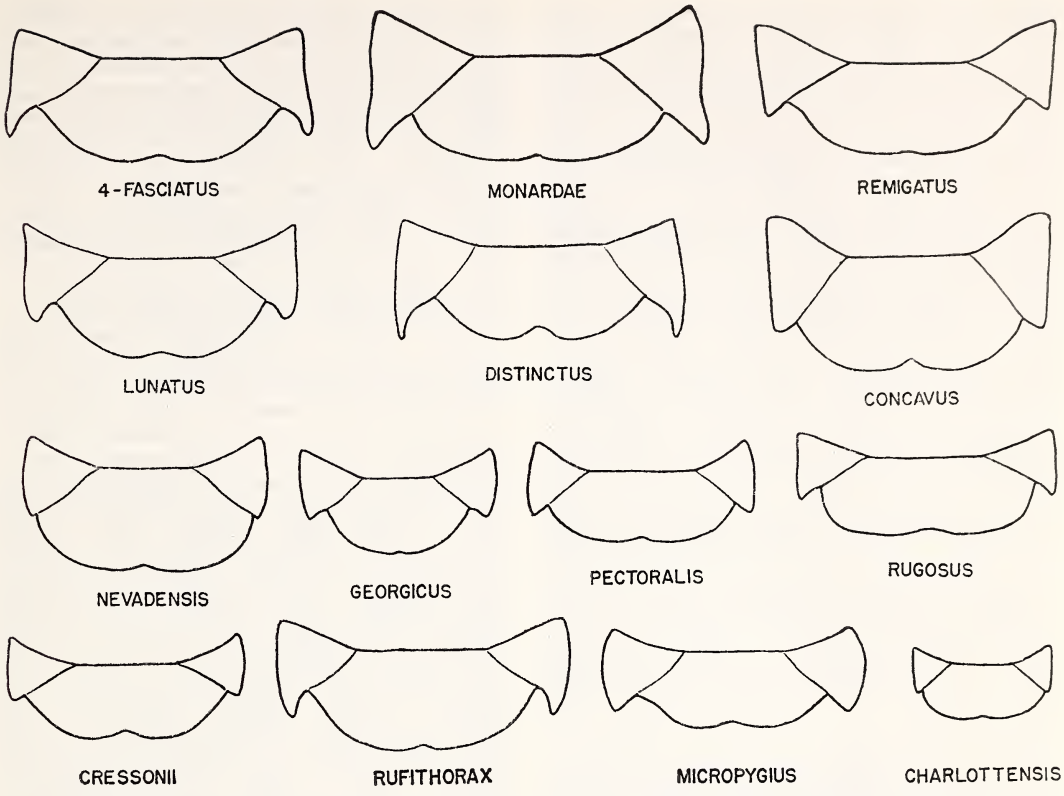


Figure 112—Scutellum and axillae in species of *Triepeolus*.

Liatris, Monarda, Nepeta, Petalostemum, Pycnanthemum, Silphium, Trifolium, Verbena and *Vernonia*.

HOST—Collection records suggest the possibility that *Peponapis pruinosa* or *Xenoglossa strenua* may be the host of this species.

Triepeolus rufithorax Graenicher
(Fig. 112)

Triepeolus rufithorax Graenicher, 1928. Ent. News 39, p. 279. ♀ ♂.

FEMALE—Length 11 mm.; black, thorax and basal tergum chiefly ferruginous, clypeus, labrum, mandibles, legs and tegulae more testaceous, spurs yellowish to testaceous; basal segment of flagellum much shorter than segment 2, these largely testaceous, following segments slightly longer than broad, brownish below, black above; space between margin of vertex and lateral ocelli considerably less than their diameter; cheeks very narrow, about one-third width of eyes, and narrower below, posterior margin carinate; median length of labrum slightly greater than half the breadth; posterior margin of scutum quite strongly outcurved, shallowly depressed medially, free part of axillae rather strongly divergent from sides of scutellum but quite short, reaching slightly beyond mid transverse line of scutellum (fig. 112); wings rather strongly fuliginous, with the usual three submarginal cells, veins piceous; face with a small amount of appressed, pale tomentum around bases of antennae and some sparse, more erect, rather elongate hairs toward ocelli; margin of pronotum densely yellow tomentose, tubercles bare but with a marginal fringe of short yellowish hairs; scutum largely bare, but often with a pair of very short and narrow lines of yellowish tomentum on each side of mid-line, anterior to mid transverse line; metanotum and adjacent margin of scutellum rather densely yellowish tomentose, with a rather dense tuft of elongate. yellowish hairs at each extreme side, back of wing bases; basal abdominal tergum with a median, triangular patch of dark tomentum, the more basal areas on each side broadly yellow tomentose, and a subapical, transverse fascia of yellow tomentum which is rather

widely interrupted medially; terga 2-4 conspicuously yellowish-hyaline apically, with transverse, yellow tomentose fasciae, tergum 5 largely covered with greyish tomentum on each side of pseudopygidium; tegulae very minutely and closely punctate anteriorly and along inner margin, largely impunctate posteriorly; punctures of face above antennae quite coarse, deep and close, but not crowded, becoming somewhat finer and irregular across vertex and on cheeks, surface below antennae very finely and closely punctate, clypeus with a very narrow, median, impunctate line, and with scattered, rather large, shallow punctures superimposed on the more finely punctate field; scutum rather coarsely rugoso-punctate throughout, scutellum somewhat more finely so, and axillae with a few shining interspaces evident; pleura with scattered, rather coarse and deep punctures that are rather widely separated, interspaces shining, becoming densely and more finely rugoso-punctate above; discs of abdominal terga beneath the dark tomentum very finely, closely and regularly punctate throughout; median length of pseudopygidium about equal to apical width, broadly rounded or subtruncate apically, covered with short, suberect, very fine, dark setae; sternum 5 broadly convex as seen from beneath.

MALE—Resembles female in general; scutum sometimes darkened; abdominal terga 5 and 6 with rather broad, apical, tomentose fasciae; sterna 2 and 3 rather broadly but thinly white fasciate apically, 4 and 5 with conspicuous, subapical fringes of elongate, more or less curved setae; pygidial plate strongly elevated above disc of tergum 7, with a distinct, transverse, submedian ridge, this part slightly longer than broad, rather narrowly rounded apically, margin carinate, surface with only a few minute and obscure punctures.

DISTRIBUTION — Florida; April to October.

FLOWER RECORDS — *Bidens, Borrichia* and *Melilotus*.

Triepeolus rugosus new species

(Fig. 112)

FEMALE—Length 10 mm.; entirely black, with only the tegulae and apical segments of legs somewhat tinged with red; basal segment of flagellum slightly shorter than segment 2, median segments only very slightly longer than broad; space between margin of vertex and lateral ocelli subequal to their diameter; cheeks about half width of eyes, slightly narrower below, hind margin carinate; median length of labrum equal to half the breadth, apical margin with a pair of submedian, very minute denticles; posterior margin of scutellum broadly outcurved, broadly and shallowly impressed medially, free part of axillae short but rather widely divergent from sides of scutellum, tips hardly reaching mid transverse line (fig. 112); wings rather deeply infuscated, with the usual three submarginal cells, veins piceous to black; median area of face with considerable whitish pubescence, this more elongate and more erect above antennae, appressed and rather dense below, extending thinly over clypeus, cheeks with rather thin, appressed tomentum; margin of pronotum whitish tomentose, this continuing as a fringe around margin of tubercles, pleura rather thinly whitish tomentose above; scutum with a pair of very narrow, anterior lines of pale tomentum on each side of midline, and with a very slight amount along lateral margins and in scutello-mesothoracic suture; metanotum and adjacent margin of scutellum rather densely pale tomentose, with a quite dense tuft of elongate, whitish hairs at each extreme side, posterior to wing bases; posterior face of propodeum quite densely white tomentose, dorsal triangle largely bare; anterior face of basal abdominal tergum densely white tomentose, this continuous at each extreme side with a rather broad, subapical tomentose fascia which is slightly interrupted medially, the resulting median, black, tomentose patch very broad and quite short; terga 2-4 with transverse, apical fasciae, these very slightly removed from rims on 2 and 3, tergum 2 with a broad patch of white tomentum on each extreme side; tergum 5 densely white tomentose on each side of pseudopygidium; tegulae very minutely and closely punctate throughout, only the very narrow outer rim impunctate punctures of face below ocelli deep, distinct, rather coarse, with some rather irregular shining interspaces evident, otherwise rather close, and close across vertex and on cheeks; face below antennae very minutely and densely punctate to apical margin of clypeus; scutum, scutellum and axillae quite deeply and distinctly punctate, the punctures slightly separated in large part, interspaces shining; pleura very coarsely rugoso-punctate below, becoming more finely and densely so above, beneath the tomentum; discs of abdominal terga beneath the black tomentum very minutely and quite closely punctate throughout; median length of pseudopygidium about equal to breadth, apical margin quite broadly curved, surface covered with rather short, suberect, fuscous setae, these becoming very fine around basal margin; sternum 5 very broadly convex as seen from beneath.

TYPE — Holotype: Female, Highland Hammock State Park, Fla., Mar. 31, 1956 (H. V. Weems, Jr.) [Fla. Plant Board]. Paratypes: 2 ♀♀, topotypical; 1 ♀, Lake Co., Fla., May 10, 1956 (Weems, on *Pontederia*).

The three females from Highland Hammock were collected hovering around a colony of *Bembex texana*.

Triepeolus simplex Robertson

Triepeolus simplex Robertson, 1903. Canad. Ent. 35, pp. 285, 286. ♀ ♂.
Triepeolus simplex Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 12 mm.; black, labrum, tegulae and more apical segments of legs suffused with ferruginous; basal segment of flagellum ferruginous, considerably shorter than segment 2, flagellum otherwise piceous below, black above, scape dark, but suffused with ferruginous at base and apex; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks slightly less than half width of eyes, somewhat narrower below, posterior margin carinate; median length of labrum slightly greater than half the breadth, apical margin with a pair of minute, median denticles; posterior margin of scutellum strongly outcurved, rather deeply impressed medially, free part of axillae rather slender and elongate, reaching slightly beyond mid transverse line of scutellum (similar to *rufithorax*, fig. 112); wings uniformly and rather lightly infuscated, with the usual three submarginal cells, veins piceous; face with considerable appressed, yellowish tomentum around bases of antennae, with some very thin, appressed tomentum below, and rather short but more erect hairs above; margin of pronotum, a transverse patch across upper part of pleura, a pair of elongate patches on scutum anteriorly, posterior lateral angles of scutum adjacent to tegulae, and a very narrow line along anterior margin of scutellum, densely yellowish tomentose, tubercles with a yellowish marginal fringe; metanotum and adjacent margin of scutellum rather densely yellow tomentose, with a tuft of elongate, yellowish hairs at each extreme side posterior to wing bases; posterior face of propodeum on each side of basal triangle quite densely, pale yellowish tomentose; basal abdominal tergum largely yellow tomentose, but with a transverse, median, quadrangular, black tomentose area, which is narrowly connected to the blackened anterior face, and the narrow apical rim blackened; terga 2 and 3 with subapical, broad, dense, yellow tomentose fasciae, 2 with a lateral, quadrangular, yellowish patch; tergum 4 with an apical, whitish tomentose fascia; tergum 5 with only scattered, appressed, greyish-white hairs; tegulae very finely, closely and quite deeply punctate throughout; punctures of face below ocelli deep, distinct, rather close and quite coarse, becoming rather sparse laterad of ocelli, but fine and very close across vertex posteriorly and on cheeks, lower half of face below antennae very finely and densely punctate throughout, with only very obscure, scattered, larger punctures evident on clypeus; scutum and scutellum rather finely and very closely punctate, with only scattered, very narrow, shining spaces at all evident, axillae with somewhat finer and irregular punctures; pleura rather coarsely and very closely rugosopunctate, punctures becoming finer and densely crowded above in region of the tomentose area; abdominal terga very finely and closely punctate beneath dense, black tomentum of discs, punctures becoming somewhat more evident and distinct on tergum 4, rather sparse on each side of tergum 5; pseudopygidium abruptly truncate apically, margin indefinite, median length about equal to half the apical breadth; sternum 5 strongly convex as seen from beneath.

MALE—Similar to female in most characteristics; tergum 5 with a narrow, subapical, greyish-white fascia, tergum 6 not fasciate; sternum 4 with a subapical fringe of elongate, apically curved setae, but sternum 5 rather uniformly short pubescent, lacking this apical fringe; pygidial plate strongly elevated above disc of tergum 7, transverse ridge obscure, hardly evident, margin strongly carinate, somewhat narrowed apically and narrowly rounded.

DISTRIBUTION — Wisconsin, Illinois and Michigan, to North Carolina and Georgia; July and August.

FLOWER RECORDS — *Helenium* and *Helianthus*. Robertson (1929) records *simplex* on *Lespedeza*, *Pycanthemum*, *Silphium*, *Teucrium* and *Verbena*.

Triepeolus sublunatus new species

MALE—Length 11 mm.; apical tarsal segments somewhat reddened, otherwise entirely black; basal segment of flagellum much shorter than segment 2, median segments very slightly longer than broad, somewhat more piceous beneath; space between margin of vertex and lateral ocelli slightly less than their diameter; cheeks very narrow, less than half width of eyes and narrower below, posterior margin carinate; median length of la-

brum somewhat greater than half the breadth, the submedian, apical denticles very minute; posterior margin of scutellum broadly rounded, rather deeply impressed medially, free part of axillae somewhat divergent from sides of scutellum, tips reaching the mid transverse line (similar to *lunatus*, fig. 112); wings rather lightly infuscated, with the usual three submarginal cells, veins brownish-piceous; face rather broadly silvery tomentose around antennae and below, more thinly so on clypeus, upper half with thin, more erect and elongate whitish hairs, cheeks very thinly tomentose; margin of pronotum densely whitish tomentose, tubercles narrowly fringed with short whitish tomentum, and pleura above thinly pale tomentose in part; scutum with a pair of obscure, elongate patches of pale tomentum on each side of midline anteriorly, lateral margins narrowly and thinly whitish tomentose, this extending partially into scutello-mesothoracic suture; metanotum and narrow adjacent margin of scutellum thinly whitish tomentose, with dense tufts of elongate, whitish hairs at each end posterior to wing bases; posterior face of propodeum rather thinly whitish tomentose on each side of triangle above, and more thinly so along lateral margins; basal abdominal tergum largely greyish tomentose, with a small, subtriangular, median, blackened area, apical rim narrowly black; tergum 2 with a broad, subapical, whitish fascia and a rather broad, lateral patch of fine and rather obscure pale tomentum; terga 3 and 4 with broad, dense, subapical fasciae, 5 and 6 with more definitely apical fasciae, surface beneath more or less reddish or testaceous; tegulae minutely and rather closely punctate along inner margin, becoming broadly impunctate and shining laterally and posteriorly; punctures of face below ocelli deep, distinct, rather coarse and slightly separated, interspaces shining, punctures becoming quite sparse between eyes and lateral ocelli, somewhat finer and quite close across vertex and on cheeks; face below antennae much more finely and densely punctate, clypeus with a median, shining, impunctate line; scutum quite deeply and rather closely and coarsely punctate, but with some shining spaces evident over median area of disc; punctures of scutellum and axillae somewhat finer and quite close, with only a few shining spaces evident on each side of scutellum; pleura below and laterally shining between deep, distinct, rather coarse and well separated punctures, these becoming very close, almost crowded above; abdominal terga with minute, uniformly close and regular punctures beneath black tomentum; pygidial plate strongly elevated above disc of tergum 7, with a median, obscure, transverse ridge, apical half beyond ridge slightly longer than broad, rather narrowly rounded apically, margin carinate, surface with some irregular, shallow pits, the more basal area quite densely, finely rugoso-punctate; sterna 2 and 3 with rather vague and indefinite, whitish, apical fasciae, 4 and 5 with subapical fringes of elongate, somewhat curved, pale hairs.

TYPE—Holotype: 1 ♂, Marion, N. C., July 29, 1924 (Mitchell, on *Coreopsis stellata*) [author's coll.].

Table 15—Distribution of species of *Triepeolus* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Triepeolus	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
alachuensis																											X
charlottensis (canadian)																											
cirsianus										X																	
concavus							X		X	X												X		X	X	X	X
coquilletti																								X			
cressonii						X	X	X		X				X					X		X	X					
distinctus																										X	X
donatus	X	X	X			X	X	X		X					X							X		X		X	
floridanus																											X
georgicus																										X	
helianthi							X		X	X																	
junctus													X									X					
lunatus				X			X		X	X	X	X		X	X				X	X	X	X	X		X	X	X
l. concolor							X		X	X	X	X			X						X	X		X	X	X	X
michiganensis						X		X					X														
micropygius									X																		
m. atripes															X							X				X	
monardae																						X					
nevadensis									X													X				X	
nigrihirtus																						X					
obliteratus							X																				
pectoralis	X	X		X	X	X	X	X	X	X	X		X								X	X				X	
quadrifasciatus (western)																											
q. atlanticus																X						X				X	X
remigatus										X		X		X	X					X	X	X				X	X
rufithorax																											X
rugosus																											X
simplex							X	X	X	X	X											X	X			X	
sublunatus																						X					

Holcopasites Ashmead

(Fig. 67)

Holcopasites Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 82. Type: *Phileremus illinoiensis* Robertson. Desig. by Crawford, 1915.

Holcopasites Crawford, 1915. Insecutar Inscitiae Menstruus 3, p. 123.

Neopasites subg. *Trichopasites* Linsley, 1942. Pan-Pacific Ent. 18, p. 127. Type: *Neopasites (Trichopasites) insoletus* Linsley. Monob. and orig. desig.

Neopasites subg. *Odontopasites* Linsley, 1942. Pan-Pacific Ent. 18, p. 128. Type: *Neopasites (Odontopasites) arizonicus* Linsley. Monob. and orig. desig.

Neopasites Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 119. (revision)

This is a parasitic group of small bees, usually with the abdomen largely or entirely red. There are but two submarginal cells in the front wing, and the antennae are located adjacent to the clypeal margin, much below the mid transverse line of the face. The males differ from those of most other bees in having 12-segmented antennae, similar to the females. Like many parasitic groups they are closely and very coarsely punctate.

KEY TO SPECIES

Females

1. Scutellum deeply grooved medially, thus strongly bilobed ..... *heliopsis* (Robertson) (p. 487)
   Scutellum only slightly incised medially on posterior margin, if at all, dorsal face not grooved 2
2. Abdominal terga 2-5 with basal, transverse, narrow, white-tomentose fasciae that are interrupted medially; terga either black or red ..... *illinoiensis* (Robertson) (p. 488)
   Terga 2-4 with four basal, white-tomentose spots that are more or less distinctly separated 3
3. Lower surface of head, laterad of hypostome, closely and deeply punctate; lateral tomentose spots on abdominal terga only slightly separated from median pair of spots ..... *calliopsidis* (Linsley)
   Area of head laterad of hypostome shining and largely impunctate, with only a few, widely separated punctures; lateral tomentose spots of terga well separated from median spots ..... *pseudocarinatus* new species (p. 489)

Males

1. Scutellum deeply grooved medially, thus strongly bilobed ..... *heliopsis* (Robertson) (p. 487)
   Scutellum only slightly incised medially on posterior margin, if at all, dorsal face not grooved 2
2. Abdominal terga 2-5 with basal, transverse, narrow, white-tomentose fasciae that are interrupted medially; terga either black or red ..... *illinoiensis* (Robertson) (p. 488)
   Terga 2-4 with four, well separated, basal, white-tomentose spots ..... *calliopsidis* (Linsley) (below)

Holcopasites (Holcopasites) calliopsidis (Linsley)

Neopasites stevensi Ainslee, 1937. Canad. Ent. 69, p. 99. (biology; misident.)

Neopasites calliopsidis Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 137. ♀ ♂.

FEMALE—Length 5-6 mm.; head and thorax black, mandibles somewhat reddened and labrum becoming reddish apically; mid and hind tibial spurs pale yellowish; tegulae blackish; wings subhyaline, veins brownish to piceous; abdominal terga largely ferruginous, with some limited blackened areas; cheeks considerably narrower than eyes; clypeus only slightly protuberant, its median length about one-third the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; median length of labrum about twice the basal width, apex rather narrowly rounded; basal segment of flagellum equal to segments 2 and 3 combined; scutum with a rather shallow, median, anterior sulcus; posterior margin of scutellum slightly impressed medially; apical margins of abdominal terga narrowly but quite abruptly depressed, basal margins of 2-4 quite strongly grooved; head and thorax rather uniformly, coarsely, closely and deeply punctate, but clypeal punctures somewhat finer, and those on venter of thorax and cheeks below well separated but hardly sparse; abdominal terga densely and somewhat more finely punctate, the depressed margins more finely punctate than the discs, tergum 5 slightly elevated medially, this area rather smooth, without evident punctures, the lateral punctures quite coarse and close; pubescence of head very short and inconspicuous, with some pale appressed tomentum around bases of antennae, and a tomentose patch on cheeks above; pronotal collar and median sulcus of scutum anteriorly white tomentose, pleura with a narrow line of white tomentum just beneath hypoepimeral area; scutellum and metanotum

with limited tomentose areas on each extreme side, and a slight amount medially; pubescence of legs very short and inconspicuous but entirely whitish; basal abdominal tergum with a pair of widely separated, basal, whitish, tomentose spots, and terga 2-4 with a series of 4 basal, tomentose spots that are only obscurely connected if at all; apical margins of terga 1-4 narrowly whitish-fasciate at each extreme side on apical margin.

MALE—Length 5-6 mm.; head, thorax and legs black, antennae somewhat reddened beneath apically, mandibles reddish, and labrum becoming testaceous apically; tegulae yellowish-hyaline or piceous, wings subhyaline, veins brownish to piceous; mid and hind tibial spurs pale yellow; abdominal terga more or less ferruginous (varying from light testaceous to deep brick red); cheeks slightly narrower than eyes; clypeus very slightly protuberant, its median length about one-third the distance between eyes; eyes subparallel; mandibles slender and simple; labrum much as in female; basal segment of flagellum equal to segments 2 plus 3 in length; scutum slightly sulcate medially toward anterior margin; posterior margin of scutellum very slightly impressed medially; puncturation much as in female, median length of pygidial plate only very slightly longer than basal width, the margins carinate, parallel, apex broadly rounded; pubescence as in female; sternum 7 more truncate apically than *illinoiensis* (fig. 114); and sternum 8 more elongate; genital armature closely resembling that in *illinoiensis*, but tips of gonocoxites somewhat reflexed.

DISTRIBUTION—Minnesota to Michigan, south to Tennessee, June to August.

Holcopasites (Holcopasites) heliopsis (Robertson)

Ammobates heliopsis Robertson, 1897. Acad. Sci. St. Louis, Trans. 7, p. 350. ♂.
Holcopasites heliopsis Crawford, 1915. Ins. Insc. Men. 3, p. 124.
Holcopasites heliopsis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Neopasites heliopsis Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 129.

FEMALE—Length 6.5 mm.; black, antennae brownish, mandibles somewhat ferruginous, labrum becoming brownish-ferruginous apically; legs blackish basally, tibiae and tarsi somewhat reddish, mid and hind spurs pale yellowish; tegulae rather dark along inner margin, becoming yellowish-hyaline along outer margin; wings subhyaline basally, becoming faintly infuscated apically, veins brownish-testaceous to piceous; impressed apical margins of abdominal terga testaceous, discs largely black; cheeks slightly narrower than eyes; clypeus rather strongly protuberant apically, its median length about one-third the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; basal width of labrum about two-thirds the median length, apex quite broadly rounded, basal half rather strongly carinate medially; basal segment of flagellum slightly less than combined length of segments 2 and 3; scutum with a shallow, median sulcus anteriorly; dorsal surface of scutellum deeply grooved, conspicuously separating the two halves both dorsally and posteriorly; narrow apical margins of abdominal terga abruptly and deeply depressed, basal margins of 2-5 deeply grooved; median length of pygidium very slightly less than basal width, margins carinate and nearly parallel, apical margin broadly truncate; punctures of head and thorax very deep, quite coarse and densely crowded above, becoming somewhat more distinctly separated on cheeks below and on a limited area of mesopleura, the propodeum more irregularly reticulate laterally, posterior face relatively smooth; punctures of abdominal terga densely crowded, discs somewhat more finely punctured than thorax, and impressed margins more finely punctate than discs; tergum 5 slightly ridged medially, this area dull but not evidently punctate, the punctures becoming relatively coarse and deep laterally; pubescence very short and inconspicuous on head and thorax, a limited area of pale tomentum around bases of antennae, on cheeks above, pronotum laterally, and on propodeum dorsally behind wing bases; abdominal terga 1-5 with a pair each of rather widely separated, small, submedian spots of yellowish tomentum, and 2-5 with smaller lateral spots, the four tomentose areas rather widely separated on each tergum; pubescence of legs hardly evident, extremely short and obscure, apparently entirely pale.

MALE—Length 5.5 mm.; color as in female; cheeks subequal to eyes in width; clypeus rather strongly protuberant, its median length about one-third the distance between eyes below; eyes slightly convergent below; mandibles slender and simple; labrum much as in female; puncturation much as in female; median length of pygidial plate only slightly less than twice the basal width, margins carinate, subparallel, apex rather broadly rounded; pubescence as in female; sternum 7 subtruncate apically, otherwise much as in *illinoiensis* (fig. 114); gonocoxites of genital armature slightly dilated toward apex, but very similar to *illinoiensis*.

DISTRIBUTION — Colorado to North Dakota and Illinois, in August.

FLOWER RECORDS — *Grindelia* and *Solidago*. Robertson (1929) collected the type series on *Heliopsis*.

Holcopasites (Holcopasites) illinoiensis (Robertson)

(Figs. 113 & 114)

Phileremus illinoiensis Robertson, 1891. Amer. Ent. Soc. Trans. 8, p. 64. ♀.
Holcopasites pratti (Ashmead ms.) Crawford, 1915. Ins. Insc. Men. 3, p. 123. *Nom. nud.* in syn.
Holcopasites illinoiensis Crawford, 1915. Ins. Insc. Men. 3, p. 124. ♀ ♂. (key)
Holcopasites illinoiensis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Neopasites illinoiensis Linsley and Michener, 1939. Amer. Ent. Soc. Trans. 65, p. 15.
Neopasites punctulatus Linsley, 1943. Amer. Ent. Soc. Trans. 69, p. 135. ♂. New synonymy.

FEMALE—Length 4.5-5.5 mm.; head and thorax black; mandibles and margin of clypeus more or less ferruginous; mid and hind tibial spurs pale yellowish; tegulae dark along inner margin, becoming yellowish-hyaline around the outer margin; wings subhyaline, veins brownish to piceous; antennal flagella dark red beneath, piceous above; discs of abdominal terga black or ferruginous, the depressed apical margins yellowish; cheeks about equal to eyes in width; clypeus quite flat, its median length not much greater than a third the distance between eyes (fig. 113); eyes subparallel; mandibles slender and simple; labrum elongate, tapering apically, its median length nearly twice the basal width, the apex rather narrowly rounded; length of basal segment of flagellum equal to segments 2 and 3 combined; scutum with a rather deep, median sulcus anteriorly; posterior margin of scutellum slightly impressed medially; apical margins of abdominal terga narrowly but abruptly depressed; punctures of head and thorax rather uniformly coarse, close and deep throughout, becoming somewhat more widely separated, but hardly sparse on venter of thorax and lower surface of cheeks laterad of the hypostomal carinae; punctures of discs of abdominal terga somewhat finer, densely crowded and quite uniform but somewhat coarser and more distinct laterally than in median area; tergum 5 slightly ridged medially, this area minutely and very densely punctate, lateral punctures becoming quite coarse and deep; median length of pygidium not much more than half the basal width,

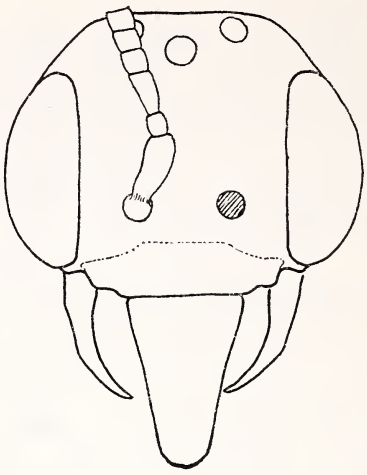


Figure 113
Facial view of head in female of *Holcopasites illinoensis*.

margins carinate, strongly converging apically to the abruptly truncate and rather narrow apical margin; sternum 5 very slightly impressed medially, the apical margin slightly incurved; pubescence of head very short and inconspicuous, hardly evident, with a small amount of appressed pale tomentum around and just above antennae; pronotal collar quite densely pale tomentose, the median sulcus of scutum with a small amount of pale tomentum anteriorly; pleura thinly white pubescent above; lateral areas of scutellum and metanotum densely pale tomentose, the propodeum with a small amount of pale tomentum on each side above; basal abdominal tergum with a pair of lateral, anterior, rounded spots of yellowish tomentum, and terga 2-4 with transverse, basal, yellowish fasciae that are interrupted medially, apical margins on 1-4 very narrowly pale fasciate at each extreme side; pubescence otherwise very short, inconspicuous and hardly evident.

MALE—Length 4.5-5.5 mm.; head and thorax black, antennal flagella becoming reddish-testaceous apically beneath, piceous above; mandibles becoming reddish apically; mid and hind tibial spurs pale yellowish; inner margin of tegulae dark, outer margin becoming more or less narrowly yellowish-hyaline; wings subhyaline, veins testaceous to piceous; discs of abdominal terga ferruginous or black, apical margins rather narrowly yellowish; cheeks slightly narrower than eyes; clypeus quite flat, its median length slightly more than one-third the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; labrum

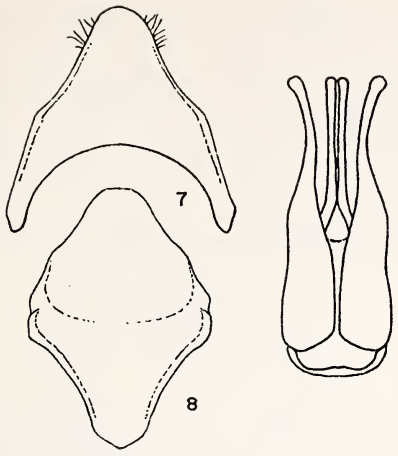


Figure 114

Sterna 7 and 8, and genital armature in male of *Holcopasites illinoensis*.

as in female; basal segment of flagellum about equal to segments 2 and 3 combined; sculpture differing but little from that of female, scutum with a rather deep, median sulcus anteriorly, posterior margin of scutellum slightly impressed medially; apical margins of abdominal terga narrowly but abruptly depressed; punctures of head and thorax rather uniformly coarse, close and deep throughout, becoming somewhat more widely separated but hardly sparse on venter of thorax and lower surface of cheeks laterad of the hypostomal carinae; punctures of discs of abdominal terga somewhat finer, densely crowded and quite uniform but somewhat coarser and more distinct laterally than in median area; tergum 5 slightly ridged medially, this area minutely and very densely punctate, lateral punctures becoming quite coarse and deep; median length of pygidial plate only slightly greater than basal width, margins strongly carinate, nearly parallel, apex broadly rounded; pattern of pubescence as in female; sterna 7 and 8 and genital armature as shown (fig. 114).

DISTRIBUTION—Illinois to Massachusetts, south to Georgia, May to August.

FLOWER RECORDS—*Ceanothus, Chrysanthemum, Erigeron* and *Oenothera*. Robertson (1929) records it also on *Coreopsis, Geum, Lespedeza* and *Pycnanthemum*.

The holotype of *Neopasites punctulatus* Linsley has been examined and compared with a rather extensive series of *illinoiensis*, and there seems to be no real difference between them. There is a considerable range of variation in *illinoiensis*, and *punctulatus* lies within this range.

Holcopasites pseudocarinatus new species

FEMALE—Length 5.5 mm.; head, thorax and legs black, antennae somewhat more piceous beneath apically, mandibles reddish-testaceous, and labrum reddish-testaceous apically, the clypeal margin very narrowly so; mid and hind tibial spurs pale yellowish; tegulae piceous; wings subhyaline basally, becoming very lightly infuscated apically, veins brownish to piceous; abdominal terga largely ferruginous, the impressed, apical margins somewhat more yellowish, median, basal areas to some degree blackened; cheeks much narrower than eyes; clypeus rather strongly protuberant apically, its median length somewhat less than half the distance between eyes below; eyes very slightly convergent below; mandibles slender and simple; basal width of labrum about three-fourths the median length, rather strongly tapering apically, apex rather narrowly rounded, with a smooth and shining, slightly elevated, median carina over basal two-thirds; length of basal segment of flagellum very nearly equal to segments 2 and 3 combined; scutum with a quite deep, median sulcus anteriorly; posterior margin of scutellum rather deeply grooved medially, but this only partially dividing the dorsal surface; punctures of head and thorax coarse, deep and very slightly separated in general, rather widely so on pleura, cheeks below shining and very sparsely punctate laterad of the proboscidial fossa; abdominal terga rather finely and very densely punctate throughout, the impressed, apical rims somewhat more finely so than the discs; tergum 5 very slightly ridged medially, without evident punctures, but becoming distinctly and quite coarsely punctate on each side; pygidium rather broadly truncate apically; pubescence very thin, short and inevident generally, but with some scale-like, whitish tomentum around bases of antennae, on cheeks above, across pronotum, in median sulcus of the scutum, and in a transverse line on upper part of pleura, continuing rather thinly around tubercles; lateral margins of scutellum, metanotum and propodeum with dense whitish tufts of tomentum; legs with entirely white but rather short and inconspicuous pubescence; basal abdominal tergum with a rather large, basal, triangular spot of pale yellowish tomentum on each side, terga 2-4 with a pair each of rather widely separated, median, rounded spots of pale tomentum and a lateral spot on each extreme side of the same color.

TYPE—Holotype: Female, U. Hill Farm, Madison, Wis., Aug. 6, 1946 (J. T. Medler, on sweet clover)

This species runs to *carinatus* Linsley in his key (1943) to the species of *Neopasites*. It resembles *carinatus* in a number of characters, including those used in the key, but the abdominal terga are somewhat blackened in the basal middle on 2-4, and the surface is very finely and densely punctate. In *carinatus* these terga are black, with red apical margin, and the surface is coarsely punctate. Also, the sparse punctures laterad of the proboscidial fossa are described as "minute" in *carinatus*, while in *pseudocarinatus* these are quite coarse.

Neolarra Ashmead

(Fig. 67)

Neolarra Ashmead, 1890. Colo. Biol. Assoc. Bul. 1, p. 8. Type: *Neolarra pruinosa* Ashmead. Monob.

Phileremulus Cockerell, 1895. Psych 7 (sup.), p. 9. Type: *Phileremulus vigilans* Cockerell. Monob. and orig. desig.

Neolarra Michener, 1939. Amer. Ent. Soc. Trans. 65, p. 347. revision

Records of this genus in the eastern states are very few, due possibly to the extremely small size of the included species. They are parasitic in the nests of *Perdita*, and studies of the biology of the host species occurring in the East should yield data on these parasites. In addition to their minute size, they are unique among the eastern bees in the degree of reduction of the wing venation, having but one submarginal cell. Also the marginal cell is very small, and is delimited by a much thickened vein.

Neolarra (Phileremulus) cockerelli (Crawford)

Phileremulus cockerelli Crawford, 1916. Ins. Insc. Men. 4, p. 139. ♀.

FEMALE—Length 3.5 mm.; breadth of abdomen 1 mm.; head and thorax chiefly black, abdomen testaceous, becoming somewhat darkened at tip; labrum testaceous; mandibles yellowish, narrowly red apically; antennae yellowish beneath, brownish above; basal segments of legs dark, tibiae and tarsi more or less testaceous, mid and hind spurs pale yellowish; tegulae testaceous; wings subhyaline, veins yellowish to piceous; cheeks somewhat narrower than eyes; clypeus only slightly protuberant, its median length about one-third the distance between eyes below; eyes very slightly convergent below; labrum rather broadly rounded apically, its median length about equal to basal width; mandibles simple, rather slender and elongate; basal segment of flagellum slightly shorter than pedicel, somewhat longer than segment 2, median segments considerably broader than long; axillae small, acute, conspicuously separated from margin of scutellum and from the posterior, lateral angle of the scutum, scutellum shallowly impressed medially; metanotum beneath narrowly produced, its apical margin slightly incurved; punctures fine and close but quite distinct over most of head and thorax, the propodeal triangle rather coarsely striate; abdominal terga microscopically roughened, without distinctly separated punctures; pygidial plate narrow and parallel-sided, rather elongate, margins carinate, apex very obscurely incised medially; pubescence greyish-white, very short and subappressed on face, cheeks, pleura and propodeum, very thin and hardly evident on scutum and scutellum but quite dense, appressed and scale-like on the lateral, posterior angles, on the metanotal process, and on propodeum beneath the median triangle; legs thinly but entirely whitish pubescent; pubescence of abdominal terga extremely short and thin, subappressed, forming rather thin, indefinite and barely evident, apical fasciae toward the sides, apical margins of the terga narrowly yellowish-hyaline.

DISTRIBUTION — Texas to Tennessee and Georgia, May to July.

HOST—One specimen of this parasite was collected by R. R. Snelling flying over a nesting area of *Perdita obscurata*.

Epeoloides Giraud

Epeoloides Giraud, 1863. Zool.-Bot. Gesell. Wien, Verh. 13, p. 45. Type: *(Epeoloides ambiguus* Giraud) = *Apis coecutiens* Fabricius. Monob.

Viereckella Swenk, 1907. Ent. News 18, p. 298. Type: *Viereckella obscura* Swenk. Orig. desig.

Epeoloides Crawford, 1917. Ent. Soc. Wash. Proc. 19, p. 167. (synonymy)

This genus is represented in the eastern United States by a single species which probably is a parasite in the nests of *Macropis*. In the front wing (fig. 67) the stigma is well developed but rather short,

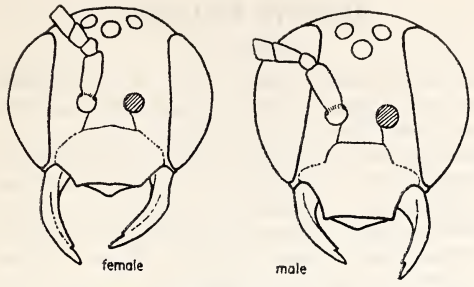


Figure 115
Facial views of head in male and female of *Epeoloides pilosula.*

the marginal cell is elongate, obliquely truncate apically, and there are three submarginal cells, the 2nd shorter than the others. Both sexes are entirely black, smooth and shining; with fine or minute puncturation, and in both the abdomen is acutely pointed posteriorly, with the pygidium well developed, but there is no pseudopygidial area. The pubescence is short but densely plumose. The eyes in the female are parallel, but in the male they are strongly convergent above, the ocellar area thus much restricted.

Epeoloides pilosula (Cresson)
(Figs. 115 & 116)

Nomada pilosula Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 77. ♂.
Epeolus pilosulus Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 426. ♀. New synonymy
Nomia compacta Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym., p. 337. ♂. New synonymy
Viereckella ceanothina Cockerell, 1907. Ent. News 18, p. 300. ♀.
Epeoloides nearcticus Ducke, 1909. Rev. Ent. Caen, 27, p. 39. ♀.

FEMALE—Length 7-9.5 mm.; black, antennal flagella somewhat more piceous, apical tarsal segments becoming brownish, spurs pale testaceous; tegulae black, minutely and rather sparsely punctate; wings hyaline basally, becoming lightly infuscated at apex, veins brownish to piceous; cheeks slightly narrower than eyes; clypeus rather strongly protuberant, its median length about half the distance between eyes; eyes subparallel (fig. 115); mandibles with a small, inner, subapical tooth; median length of labrum about half the breadth, margin broadly truncate and straight; shorter side of basal segment of flagellum slightly longer than pedicel, the longer side subequal to segment 2, following segments only slightly longer than broad; surface of head and thorax shining, punctures quite coarse, deep and distinct, quite close over lower half of face and clypeus, rather sparse on each side above antennae and on vertex medially, well separated on scutum and scutellum, quite close on pleura, minute and sparse over most of propodeum; abdominal terga smooth and shining, punctures exceedingly minute and rather sparse, apical margins only very slightly impressed, becoming narrowly yellowish-hyaline on the rims; median length of pygidium about equal to basal width, margins carinate, strongly converging to the very narrowly rounded or subtruncate apex; scutellum rather deeply grooved medially; pubescence white, rather short and thin over most of head, somewhat more dense on cheeks; scutum with erect, black pubescence medially, lateral margins and a very narrow median line white pubescent; axillae with a tuft of black pubescence; pleura, propodeum and scutellum entirely pale pubescent, hairs rather long and copious; pubescence of legs largely whitish, but mid tibiae with some brownish pubescence apically, basitarsi with brownish pubescence beneath; abdominal terga with rather indefinite, whitish, apical fasciae evident toward sides but widely interrupted medially, discal pubescence extremely short and obscure, hardly evident, apparently largely pale.

MALE—Length 7.5-10 mm.; black, antennal flagella brownish beneath, more piceous above, mandibles becoming reddened apically, apical tarsal segments brownish-testaceous, spurs pale testaceous; tegulae piceous, smooth and shining, very minutely and rather sparsely punctate; wings hyaline basally, becoming somewhat clouded apically, veins testaceous to brownish; abdominal terga becoming narrowly yellowish-hyaline along rims; cheeks subequal to eyes in width; clypeus rather strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes strongly divergent below (fig. 115); lateral ocelli separated from eyes by about half their diameter; mandibles with a distinct, inner, subapical tooth; median length of labrum considerably less than half the breadth, margin very shallowly incurved on each side, but nearly straight medially, with a strong denticle; surface of head and thorax shining, punctures deep, distinct and quite coarse, quite close over most of face, somewhat more sparse on cheeks, close over most of scutum, but becoming rather sparse posteriorly and rather sparse on scutellum anteriorly, quite close over most of pleura; propodeum shining, punctures minute and sparse

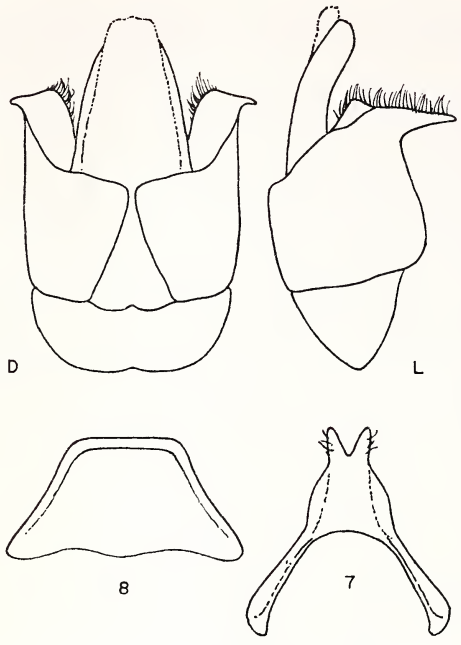


Figure 116

Sterna 7 and 8, and dorsal and lateral views of genital armature in male of *Epeoloides pilosula*.

posteriorly, becoming somewhat deeper and closer on each side; abdominal terga shining, punctures minute, well separated, rather close at sides but becoming rather sparse medially, apical margins of terga only very slightly and narrowly impressed; pubescence of head rather copious but short, entirely whitish, not hiding surface, scutum with fuscous pubescence medially, and axillae with a tuft of fuscous hairs, thorax otherwise largely covered with rather copious, whitish pubescence that does not obscure the surface; abdominal terga with rather indefinite, whitish, apical fasciae, these widely interrupted on the more basal terga, discal pubescence very short but erect, apparently entirely pale; pygidial plate narrow, tongue-like, slightly narrower toward base than toward apex, rounded apically; sterna 7 and 8, and genital armature as shown (fig. 116).

DISTRIBUTION—Michigan to the New England states, south to Georgia, June and July.

FLOWER RECORDS — *Apocynum, Galax, Houstonia* and *Rubus*.

Melecta Latreille

(Fig. 118)

Melecta Latreille, 1802. Hist. Nat. Fourmis, p. 427. Type: *(Apis) Centris punctata* (Fabricius). Desig. by Latreille, 1810.

Symmorpha Klug, 1807. Mag. of Insektenk 6, pp. 198-227. Type: *(Apis) Centris punctata* (Fabricius). Monob.

Bombomelecta Patton, 1879. U. S. Geol, and Geog. Surv. Bul. 5, p. 370. Type: *Melecta thoracica* Cresson. Monob.

Melecta Linsley, 1939. Ent. Soc. Amer. Ann. 32, pp. 433-463. (revision)

Bees in the genus *Melecta* are rather robust parasites in the nests of *Anthophora,* and they bear a superficial resemblance to the host species. The marginal cell is very short, not reaching beyond the outer limits of the 3rd submarginal cell. The maxillary palpi have 5 or 6 segments. The inner ramus of the tarsal claws is long and slender. Species of *Melecta* differ conspicuously from those in *Xeromelecta* in lacking any ornamentation of the abdominal terga with pale tomentose bands or spots.

Melecta (Melecta) pacifica atlantica Linsley

(Figs. 117 & 118)

Bombomelecta thoracica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records). (misident.)

Melecta (Melecta) atlantica Linsley, 1943. N. Y. Ent. Soc. Jour. 51, p. 225. ♀.

Melecta (Melecta) atlantica Michener, 1948. Ent. Soc. Wash. Proc. 50, p. 17. ♀ ♂.

Melecta pacifica atlantica Michener, 1954. Kans. Ent. Soc. Jour. 27, p. 66.

FEMALE—Length 12-13 mm., breadth of abdomen 5-5.5 mm.; entirely black, including antennae, mandibles, legs, spurs and tegulae; wings subhyaline at base, becoming lightly infuscated apically, veins brownish to piceous; cheeks about as broad as eyes; clypeus strongly protuberant, its median length somewhat less than half the distance between eyes below; eyes very slightly convergent below; mandibles with a robust, inner, submedian tooth (fig. 118); labrum strongly reflexed at sides, its median length only slightly less than basal width, apical margin subtruncate medially; basal segment of flagellum somewhat longer than segment 2, median segments slightly longer than broad; scutellum bilobed, the lobes acute but hardly spinose apically; punctures densely crowded over most of head

and thorax, somewhat more distinct on clypeus, apical margin narrowly shining and impunctate, and labrum shining, with irregular, scattered and rather vague punctures; abdominal terga smooth and somewhat shining, punctures exceedingly minute, well separated on basal tergum but becoming progressively closer on the more apical terga, becoming quite densely crowded on terga 4 and 5; pygidium very narrow and elongate, narrowly rounded apically; pubescence bright ochraceous to almost fulvous on scutum, scutellum, prothoracic tubercles and across pronotum, the vertex with some pale ochraceous pubescence posteriorly, otherwise head and thorax with copious and elongate black pubescence, and legs entirely black pubescent; basal abdominal tergum with some elongate and rather copious pubescence anteriorly, this usually black but with an intermixture of pale hairs in some specimens, the following terga with rather dense but fine, suberect, black pubescence that does not hide the surface, hairs becoming somewhat more elongate laterally on the more apical terga.

MALE—Length 12 mm., breadth of abdomen 5 mm.; entirely black, including antennae, mandibles, legs, spurs and tegulae; wings subhyaline basally, becoming lightly infuscated apically, veins piceous; cheeks slightly broader than eyes; clypeus strongly protuberant, its median length somewhat greater than half the distance between eyes below; eyes very slightly convergent below; labrum quite strongly reflexed laterally, median length only slightly less than the breadth, apical margin subtruncate medially; mandibles with a robust, inner, subapical tooth; basal segment of flagellum subequal to segment 2, following segments about the same length, very slightly longer than broad; scutellum strongly bilobed, the lobes angulate but hardly spinose; entire thorax, and head in large part, very finely and densely punctate; clypeus somewhat more distinctly punctate apically, the margin shining; labrum shining, with irregular, more or less separated punctures; vertex somewhat more coarsely but closely punctate; abdominal terga somewhat shining, punctures exceedingly minute, slightly separated on the more basal terga, becoming progressively closer laterally and on the more apical terga; tergum 7 ending in a quite narrow process which is slightly emarginate; scutum and scutellum densely covered with long, copious, pale ochraceous pubescence, tubercles with a fringe of pale hairs, pronotum in large part and vertex posteriorly pale pubescent; head and thorax otherwise with copious and elongate black pubescence, legs entirely black pubescent; basal abdominal tergum with considerable erect and rather copious, largely black pubescence anteriorly, following terga rather densely covered with very short, erect, black pubescence which does not hide surface; sterna 7 and 8 and genital armature as shown (fig. 117).

DISTRIBUTION—Kansas to New Jersey, south to Alabama and Georgia, March to May.

FLOWER RECORDS—Robertson (1929) records this species (as *Bombomelecta thoracica*) on *Fragaria, Lithospermum* and *Pentstemon.*

HOST—Collection records indicate the probability that *Anthophora ursina* is the host of *atlantica.*

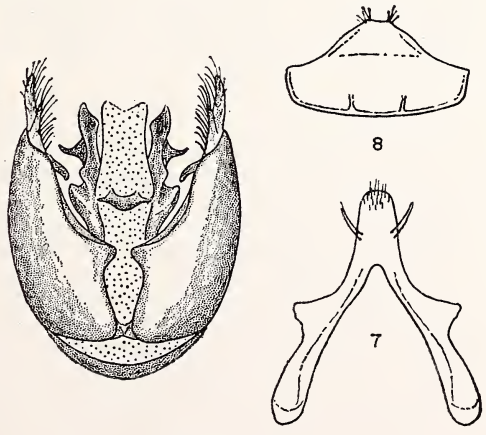


Figure 117

Sterna 7 and 8, and genital armature in male of *Melecta pacifica atlantica.*

Xeromelecta Linsley

(Fig. 118)

Melecta subg. *Xeromelecta* Linsley, 1939. Ent. Soc. Amer. Ann. 32, p. 450. Type: *Bombomelecta larreae* Cockerell. Monob. and orig. desig.

Xeromelecta Hurd and Linsley, 1951. Calif. Ins. Surv. Bul. 1, p. 119.

This genus of parasites is very similar to *Melecta,* but differs in having only 3 or 4 segments in the maxillary palpi, and in having the abdominal terga conspicuously ornamented with dense, cream-colored bands or spots of appressed tomentum. The inner ramus of the tarsal claws is short and lobe-like.

KEY TO SPECIES

Males & Females

1. Propodeal spiracle bounded posteriorly by

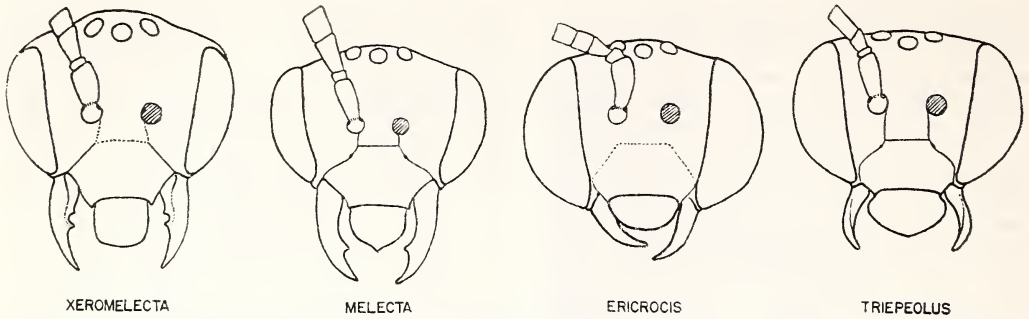


Figure 118—Facial view of head in females of the parasitic genera of Anthophoridae.

an elevated rugose ridge which is strongly carinate above .... *californica* (Cresson) (below)
Surface of propodeum posterior to spiracle quite flat and unmodified .... *interrupta* (Cresson) (p. 496)

Xeromelecta (Melectomorpha) californica (Cresson)

(Fig. 119)

Melecta californica Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 91. ♂ ♀.
Melecta miranda Fox, 1893. Ent. News 4, p. 143. ♀.
Pseudomelecta pasadenensis Cockerell, 1910. Ann. Mag. Nat. Hist. (8) 5, p. 27. ♀.
Melecta sladeni Viereck, 1924. Canad. Ent. 56, p. 15. ♀.
Melecta miranda Hicks, 1926. Univ. Colo. Studies 15, p. 224. (biology)
Melecta californica Linsley and MacSwain, 1942. Amer. Midland Nat. 27, p. 408. (biology)
Xeromelecta (Melectomorpha) californica Hurd and Linsley, 1951. Calif. Ins. Surv. Bul. 1, No. 5, p. 132 and map. 5.

FEMALE—Length 8-14 mm., breadth of abdomen 3-4.5 mm.; black, mandibles somewhat paler apically, apical tarsal segments becoming brownish, spurs piceous; tegulae testaceous-hyaline; wings subhyaline, with brown blotches, apex just beyond the outermost cells abruptly and deeply infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus strongly protuberant, its median length somewhat less than half the distance between eyes below; eyes very slightly convergent below; mandibles slender apically, inner margin with a pair of distinct, inner teeth toward base; median length of labrum about equal to the breadth, apical margin subtruncate; basal segment of flagellum slightly longer than segment 2, median segments about as long as broad; scutum slightly sulcate medially, sparsely punctate and shining near mid-line anteriorly, somewhat depressed in region of notaulices; scutellum quite deeply grooved and lobate, each lobe acute apically; lateral faces of propodeum with a rugose ridge posterior to spiracle, this strongly carinate above and united with anterior lip of spiracle; face, clypeus and cheeks closely and rather finely punctate in general, punctures somewhat coarser and more distinct below ocelli and on vertex laterally; thoracic punctures somewhat coarser, deeper and more distinctly separated, somewhat finer and closer on scutum between notaulices and tegulae, quite coarse and nearly contiguous over most of pleura, the propodeum laterally more reticulate; abdominal terga rather smooth, punctures exceedingly minute, close and obscure beneath dense tomentum; pygidium narrow and elongate, shining, with a low median ridge, margins carinate, apex narrowly rounded; pubescence of head quite copious but rather short, very short and dense over clypeus, hiding the surface, more elongate and erect above antennae, greyish-white in large part, with some intermixture of brownish hairs on upper part of face and on vertex, somewhat darkened on cheeks posteriorly; anterior third of scutum with a pair of subquadrate patches of short, fuscous pubescence that are narrowly fringed posteriorly with pale hairs and separated by a median band of ochraceous pubescence; latero-anterior angle of scutum, pleura above, and propodeum in large part, with quite copious, dense and erect, whitish pubescence; posterior two-thirds of scutum with very short and thin blackish pubescence that is quite obscure, axillae densely covered with short fuscous or blackish pubescence, and scutellum with erect, fuscous hairs and fringed posteriorly with fine, whitish pubescence; abdominal terga 1 and 2 with conspicuous, transverse, apical bands of whitish tomentum that are rather widely separated medially, slightly narrowed laterally, quite abruptly broadened at sides

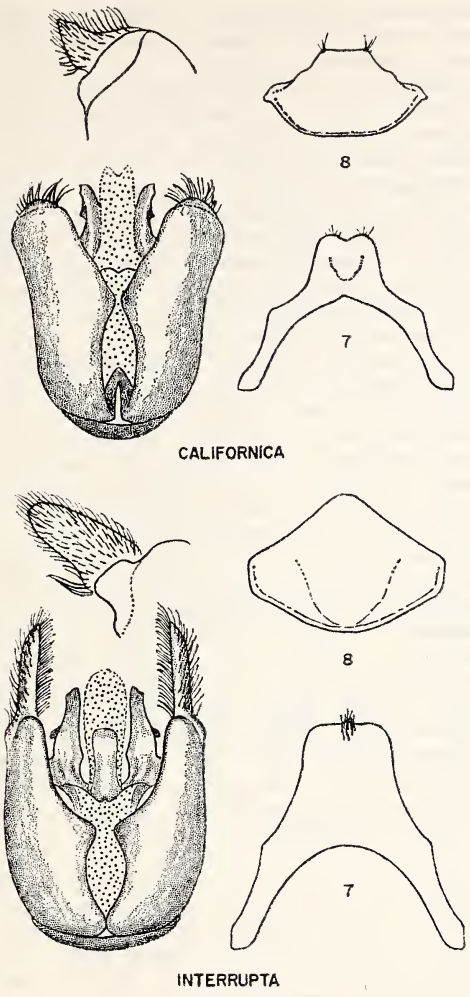


Figure 119
Sterna 7 and 8, dorsal view of genital armature, and lateral view of gonostyli in males of *Xeromelecta*.

to occupy the entire lateral margins; terga 3 and 4 with a pair of submedian rounded spots of whitish tomentum that are more or less separated from similar lateral tomentose areas, resulting in four more or less distinct spots; tergum 5 with a very narrow submedian pale fascia that is slightly interrupted medially; discs of terga otherwise quite densely covered with very fine, appressed, black tomentum, contrasting sharply with the yellow-tomentose maculations; pleura fuscous pubescent below; legs basally with very short, largely whitish pubescence, tibiae with pale pubescence on outer face but with basal and apical areas of very short, dark pubescence, resulting in a spotted appearance; basitarsi with pale pubescence on outer face, inner surfaces densely covered with brownish hairs.

MALE—Length 9-13 mm., breadth of abdomen 3-4 mm.; black, mandibles faintly testaceous apically, tarsal segments becoming brownish apically, spurs piceous to black; tegulae testaceous-hyaline; wings subhyaline, with brownish infusions apically, apex beyond the cells abruptly and deeply infuscated, veins brownish to piceous; cheeks somewhat narrower than eyes; clypeus strongly protuberant, its median length slightly less than half the distance between eyes below; eyes rather strongly convergent below; mandibles slender apically, with a pair of well developed, inner, submedian teeth; basal segment of flagellum considerably longer than segment 2, median segments slightly broader than long; median length of labrum somewhat greater than breadth, apical margin subtruncate, sides parallel; scutum shallowly sulcate medially and somewhat depressed in region of notaulices; scutellum rather deeply impressed medially, bilobate, apex of each lobe subacute; lateral faces of propodeum with a rugose ridge posterior to spiracle, this strongly carinate above and united with anterior lip of spiracle; punctures of cheeks, lower part of face and clypeus quite close and rather fine, becoming somewhat coarser and more distinctly separated above antennae and across vertex; thoracic punctures relatively coarse and deep, well separated over most of scutum and scutellum, becoming fine and close along notaulices, close to crowded on pleura, close and somewhat finer on propodeum; abdominal terga relatively smooth, punctures microscopic and rather close and uniform beneath dense tomentum, the narrow apical margins relatively smooth, especially on the more apical terga; pubescence of face and cheeks quite copious, greyish-white in general, some dark hairs intermixed at sides of face below antennae, around ocelli, and on cheeks posteriorly; anterior third of scutum with a pair of small angulate spots of fuscous pubescence on each side of median sulcus, separated by an equally wide area of pale pubescence that reaches the latero-apical angles; pleura above and propodeum with rather elongate, greyish-white pubescence; posterior two-thirds of scutum with rather short but erect blackish pubescence, axillae densely covered with short, black pubescence, and scutellum with scattered, elongate dark hairs in the generally light pubescence; pubescence of pleura below fuscous, more or less intermixed with a few pale hairs, legs largely pale pubescent, outer surface of front tibiae with a median, transverse band of short fuscous pubescence, mid tibiae densely covered with short, cream-

colored tomentum through most of its length, and hind tibiae thinly covered with whitish pubescence; tarsi largely covered with thin, whitish pubescence on outer surface, inner surface with dense brownish pubescence; abdominal terga 1-5 with broad and conspicuous, apical or subapical bands of dense, whitish tomentum, these slightly separated medially, more or less constricted toward the broadened outer ends which more or less completely cover the lateral margins, those on 3-5 more or less widely removed from apical margin and subinterrupted laterally; tergum 6 with a pair of small, rather widely separated and indefinite spots of pale tomentum; pygidial plate of tergum 7 represented by a pair of angles, separated by a triangular, median, emarginate area; sterna 7 and 8 and genital armature as shown (fig. 119).

DISTRIBUTION—Mexico to British Columbia, east to Illinois. It is probably in flight through the summer months.

HOST—*Anthophora abrupta*. Other species of *Anthophora* have been recorded as hosts in the West.

Xeromelecta (Melectomorpha) interrupta (Cresson)

(Fig. 119)

Melecta interrupta Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 275. ♀ ♂.

Melecta interrupta var. *fallugiae* Cockerell, 1904. Ann. Mag. Nat. Hist. (7) 14, p. 13.

Melecta interrupta Robertson, 1929. Flowers tnd Insects, Lancaster, Pa., Science Press. (flower records)

Xeromelecta (Melectomorpha) interrupta Hurd and Linsley, 1951. Calif. Ins. Surv. Bul. 1, p. 132 and Map 5.

FEMALE—Length 15-16 mm., breadth of abdomen 5 mm.; black, mandibles ferruginous medially, legs dark red to piceous, spurs black; tegulae brownish to testaceous-hyaline; wings quite uniformly infuscated, somewhat darker apically, with hyaline band along the outermost veins, these brownish to piceous; cheeks somewhat narrower than eyes; clypeus strongly protuberant, its median length about half the distance between eyes below; eyes slightly convergent below; mandibles slender apically, inner margin with a pair of distinct, inner teeth toward base; median length of labrum about equal to the breadth, apical margin subtruncate; basal segment of flagellum slightly longer than segment 2, median segments about as long as broad; scutum slightly sulcate medially, somewhat depressed in region of notaulices; scutellum shallowly grooved and lobate; pygidial plate broadly triangular; face, clypeus and cheeks rather closely and finely punctate in general, the punctures somewhat more widely separated between eyes and ocelli and on vertex medially; thoracic punctures rather fine and close, coarser on pleura below, and close on scutum between notaulices and tegulae; propodeum laterally not ridged, finely punctate; abdominal terga rather smooth, punctures exceedingly minute, close and obscure beneath dense tomentum; pygidium broadly triangular, margins carinate, apex narrowly rounded; pubescence of head quite copious but rather short, pale yellow around antennae and along vertex, blackish on cheeks and across lower part of face, anterior third of scutum and pleura above with quite dense, yellowish pubescence, and dense tufts of longer yellow hairs on propodeum posterior to wing bases, the posterior and lateral faces dark pubescent, that on pleura below and venter of thorax black; abdominal terga 1-3 with conspicuous, transverse, apical bands of pale yellowish tomentum that are interrupted medially, narrowly broadened at sides to occupy most of lateral margins; tergum 4 quite broadly tomentose on each side, these areas well separated medially; tergum 5 with similar but smaller tomentose areas; discs of terga otherwise quite densely covered with very fine, appressed, black tomentum, contrasting sharply with the yellow-tomentose maculations; legs with short, largely dark pubescence.

MALE—Length 13-14 mm., breadth of abdomen 4.5-5.0 mm.; black, including mandibles, legs and spurs; tegulae piceous; wings quite deeply infuscated, a hyaline band along outermost veins, these piceous to black; cheeks somewhat narrower than eyes; clypeus strongly protuberant, its median length slightly less than half the distance between eyes below; eyes rather strongly convergent below; mandibles slender apically, with a pair of well developed, inner, submedian teeth; basal segment of flagellum considerably longer than segment 2, median segments distinctly broader than long; median length of labrum subequal to breadth, apical margin subtruncate, sides parallel; scutum shallowly sulcate medially and somewhat depressed in region of notaulices; scutellum shallowly impressed medially, bilobate, apex of each lobe obtuse; punctures of lower part of face and clypeus quite close and rather fine, becoming somewhat coarser and more distinctly separated above antennae, on cheeks and across vertex; thoracic punctures relatively coarse and deep, slightly separated over most of scutum and scutellum, very fine and close between notaulices and tegulae, close on pleura, somewhat

finer on propodeum; abdominal terga relatively smooth, punctures microscopic and rather close and uniform beneath dense tomentum, the narrow apical margins relatively smooth, especially on the more apical terga; pubescence of face and cheeks quite copious, yellowish in general, some dark hairs intermixed at sides of face below antennae, across clypeus and on cheeks; anterior third of scutum, upper part of pleura, and posterior, lateral angle of propodeum with dense and elongate, pale yellowish to fulvous pubescence, otherwise thorax with short black pubescence; axillae densely covered with short, black pubescence; legs largely black pubescent, but front femora with a few pale hairs toward apex posteriorly, and mid tibiae densely covered with short, cream-colored or yellowish tomentum through most of its length; abdominal terga 1-5 with broad and conspicuous, apical bands of dense, pale yellowish or fulvous tomentum, these rather widely interrupted medially, outer ends broadened to cover most of each plate; apical margins of tergum 7 with a shallow, median emargination; sterna 7 and 8 and genital armature as shown (fig. 119).

DISTRIBUTION — Arizona and Colorado to Minnesota, Wisconsin and Illinois. It is probably in flight through the summer months.

FLOWER RECORD—Robertson (1929) records this only on *Pycnanthemum flexuosum.*

HOST—*Anthophora abrupta.*

Ericrocis Cresson

(Fig. 118)

Ericrocis Cresson, 1887. Amer. Ent. Soc. Trans. Sup. Vol. pp. 131 & 134. Type: *Crocisa? lata* Cresson. Monob.

Ericrocis Linsley, 1939. Ent. Soc. Amer. Ann. 32, pp. 463-468. (revision)

Ericrocis more nearly resembles *Xeromelecta* than any of the other parasitic Anthophoridae. The species are probably parasitic on *Centris*, but are of very rare occurrence in the eastern United States. The abdomen is sharply acute at apex, and lacks the pseudopygidial area found in many other parasites. In this it resembles *Melecta* and *Xeromelecta*, but differs from both in having a much elongated marginal cell. In the male the abdomen has no pygideal plate, and the mid tibial spurs are blunt apically, to some degree emarginate or bifurcate. In the pubescence these bear a strong resemblance to *Xeromelecta*, having very similar patterns of pale tomentose bands or spots on the abdominal terga.

Ericrocis lata (Cresson)

(Fig. 120)

Crocisa? lata Cresson, 1878. Amer. Ent. Soc. Trans. 7, p. 91. ♂.

Ericrocis lata Cresson, 1887. Amer. Ent. Soc. Trans. Sup. Vol., p. 298.

FEMALE—Length 11 mm., breadth of abdomen 4 mm.; black, antennae piceous beneath, black above, apical tarsal segments becoming more piceous, mid and hind spurs brownish-testaceous; tegulae yellowish-hyaline, very large, broadly rounded or subtruncate posteriorly; wings pale brownish basally, becoming quite deeply infuscated toward apical margin, veins brownish to piceous; cheeks much narrower than eyes; clypeus quite flat, its median length about half the distance between eyes below; eyes slightly convergent below (fig. 118); mandibles with a slight, inner, subapical angle; basal segment of flagellum slightly shorter than segment 2, median segments very slightly longer than broad; mid tibial spurs deeply incised just before apex; scutellum deeply grooved; punctures over median and lower parts of face and on cheeks fine and close beneath dense pubescence, face and vertex above shining and bare, punctures relatively coarse, deep and sparse, becoming close and fine along margin of vertex; scutum with a deep, median, longitudinal sulcus; punctures of scutellum, and of scutum medially and posteriorly, extremely minute and close, densely crowded, becoming more coarse and distinctly separated toward sides anteriorly; pleura quite coarsely punctate, closely so above, beneath dense pubescence, the lower exposed area with coarse, irregular punctures that are to some degree separated, interspaces shining; lateral faces of propodeum largely bare and shining, punctures shallow but rather close, obsolescent below; punctures of abdominal terga uniformly microscopic and densely crowded, surface becoming almost tessellate rather than punctate; pygidium rather indefinite, its median length slightly less than basal width, margins subcarinate, surface quite coarsely punctate toward base, becoming smooth and shining apically, apex subacute; median area of face around antennae densely covered with short but copious, whitish or golden pubescence, lower half of face, cheeks, and vertex in part, black pubescent; area below ocelli largely

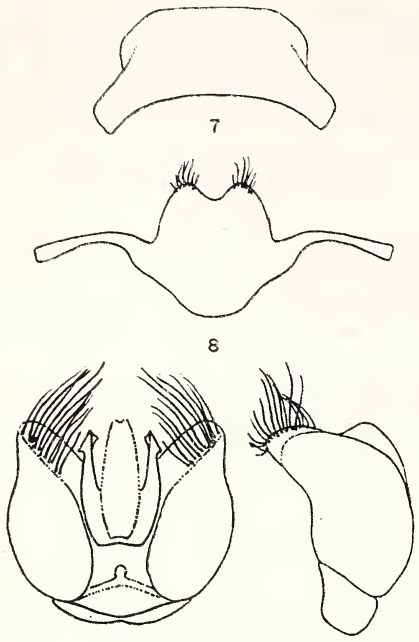


Figure 120
Sterna 7 and 8, and dorsal and lateral views of genital armature in male of *Ericrocis lata*.

bare, vertex fringed posteriorly with lighter pubescence; upper part of pleura quite densely ochraceous pubescent, and propodeum with an area of dense, elongate, ochraceous pubescence behind wing bases; scutum anteriorly with some brownish pubescence on each side and in median sulcus, these separated by a narrow area of more fuscous pubescence, the posterior two-thirds, axillae and clypeus with very short, subappressed, fuscous tomentum, propodeum medially with some erect, black pubescence; lower portion of pleura with very short, black pubescence which does not obscure surface, and legs largely black pubescent, but tibiae with a basal area of ochraceous pubescence on outer face; basal abdominal tergum broadly yellow tomentose on each side, this area rather broadly rounded and rather widely separated medially; apical impressed areas of terga 2-5 yellow tomentose on each side, these areas widely separated medially but connected by a broad, lateral, continuous band, those on tergum 2 extended for some distance obliquely toward midline; discs of terga otherwise densely black tomentse, contrasting sharply with the yellow tomentose areas; tergum 6 with rather sparse, erect, black bristles.

MALE—Length 12 mm., breadth of abdomen 4 mm.; black, antennae piceous, apical tarsal segments becoming piceous, and mid and hind spurs brownish-piceous; tegulae yellowish-hyaline, very large, broadly rounded posteriorly; wings lightly infuscated basally, becoming quite deeply so apically, veins brownish to piceous; cheeks nearly equal to eyes in width; clypeus rather strongly protuberant, its median length about half the distance between eyes below; eyes slightly convergent below; mandibles rather slender, with a slight, inner, subapical angle; shorter side of basal segment of flagellum subequal to segment 2, median segments about as broad as long; mid tibial spur as in female; scutum with a deep, median sulcus, the scutellum deeply grooved medially; puncturation of head and thorax much as in female; puncturation of abdominal terga 1-4 as in female, but terga 5-7 becoming more coarsely, distinctly and closely punctate; apical margin of tergum 7 slightly incised medially; pubescence of face quite dense and copious but rather short, largely yellow, with an obscure fringe of black hairs on clypeus laterally, labrum entirely black; median length of labrum slightly greater than half the breadth, margin truncate medially; cheeks black pubescent; vertex largely ochraceous pubescent, but with some dark hairs around ocelli and toward upper end of eyes; pubescence of thorax and legs much as in female, but scutellum with a rather distinct band of short, ochraceous pubescence on each side; lateral, yellow tomentose areas of basal abdominal tergum narrowly rounded at inner end, nearly meeting; apical impressed areas of terga 2-5 yellow tomentose as in female, but bands less widely separated medially, those on 5 more whitish, discal pubescence very short and black as in female; sterna 7 and 8 and genital armature as shown (fig. 120).

DISTRIBUTION—Southern California to Florida, May or June.

Table 16—Distribution of species of *Holcopasites, Neolarra, Epeoloides, Melecta, Xeromelecta* and *Ericrocis* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Holcopasites	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
calliopsidis								X													X						
heliopsis									X																		
illinoiensis				X					X				X						X	X	X	X	X			X	
pseudocarinatus							X																				
Neolarra																											
cockerelli																					X					X	
Epeoloides																											
pilosula				X		X		X			X		X						X			X				X	
Melecta																											
pacifica (western)																											
p. atlantica									X					X								X	X		X	X	
Xeromelecta																											
californica							X		X																		
interrupta							X		X																		
Ericrocis																											
lata																											X

FAMILY XYLOCOPIDAE

Only two genera are included in the Xylocopidae as it occurs in the Eastern United States, *Ceratina,* the small carpenter bees, and *Xylocopa,* the large carpenter bees. In both of these genera there are three submarginal cells in the front wing, the second subtriangular in form; the glossa is of the slender, elongate form; the clypeus is quite flat; the lower end of the eye is in practical contact with the base of the mandible, the malar space thus lacking; there are no facial foveae and no pygidial plate; the front coxae are transverse; and the scopa is located on the hind tibiae and basitarsi.

KEY TO GENERA

1. Large and robust (20 mm. or more); 1st transverse cubitus nearly parallel to costa; metanotum vertical in position, forming a part of the posterior surface of the thorax ..... *Xylocopa* (p. 507)
   Relatively small (6-8 mm.), slender; 1st transverse cubitus oblique with respect to the costa; metanotum horizontal, forming a part of the dorsal surface of the thorax ..... *Ceratina*

Ceratina Latreille

(Fig. 121)

Clavicera Latreille, 1802. Hist. Nat. Fourmis, p. 433. Type: *(Hylaeus albilabris* Fabricius) = *Apis cucurbitina* Rossi. Monob.

Ceratina Latreille, 1802. Hist. Nat. Crust. Ins. 3, p. 380. Proposed to replace *Clavicera.* Type: *(Hylaeus albilabris* Fabricius) = *Apis cucurbitina* Rossi.

Zadontomerus Ashmead, 1899. Amer. Ent. Soc. Trans. 26, p. 69. Type: *Ceratina tejonensis* Cresson. Monob. and orig. desig.

Zadontomerus Cockerell and Porter, 1899. Ann. Mag. Nat. Hist. (7) 4, p. 406. Emend.

Ceratina Smith, 1907. Amer. Ent. Soc. Trans. 33, p. 115. (key)

Ceratina Sandhouse, 1935. Ent. Soc. Wash. Proc. 37, p. 93. (eastern spp.)

Zadontomerus Michener, 1936. Amer. Mus. Novitates 844, p. 1. (key)

Ceratinula Moure, 1941. Mus. Paranaense Arq. 1, p. 78. Type: *Ceratina lucidula* Smith. Orig. desig.

Our species of *Ceratina* are black, bluish-green or blue, often with yellowish or ivory maculations on the clypeus, pronotal tubercles and legs. In the front wing the stigma is well developed. Although the clypeus is quite flat, the labrum is quite fully exposed by the closed mandibles. These have a broad base, but the upper margin is deeply concave, with the apex slender. The labrum fits into the resulting space. The thorax is gradually declivous posteriorly, the menanotum and dorsal area of the propodeum forming a part of the dorsal surface. The abdomen in the female is obtusely angulate at the apex, while in the male the sixth tergum may bear a low median tuft of hairs that superficially resembles the angle in the females. Tergum 7 in the males is well developd, occupying a more ventral position, and is either conspicuously carinate or tuberculate.

These bees commonly nest in the pithy stems of plans. Several papers on their biology have been published by Ashmead, Packard, Rau, Graenicher, Hicks and Krombein. (See *C. dupla.* p. 503)

KEY TO SPECIES

Females

1. Scutum and head in large part polished and impunctate .... *cockerelli* H. S. Smith (p. 501)
   Head and scutum with numerous coarse, deep and distinct punctures 2
2. Front tibiae with a basal ivory stripe . 3
   Front tibiae with at most a basal ivory spot; usually larger (7 mm. or more) 4
3. Small (5-6 mm.); scutellum somewhat swollen, the punctures well separated; color usually more greenish .... *metallica* H. S. Smith (p. 506)

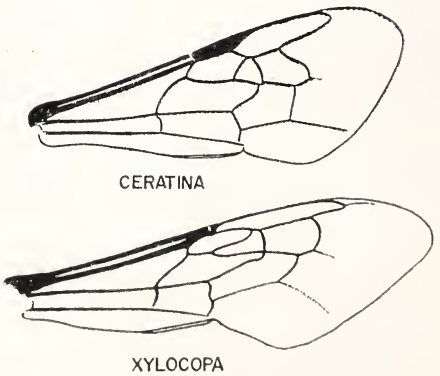


Figure 121
Venation of front wing in *Ceratina* and *Xylocopa.*

Usually larger; scutellum quite flat, and closely punctate; color more bluish .. *dupla floridana* new subspecies (p. 505)

4(2). Abdominal terga 2 and 3 with close, almost crowded punctures, separated in center of discs by less than their own diameter ..... *dupla floridana* new subspecies (p. 505)

Punctures in center of discs of abdominal terga more widely separated 5

5. Area between notaulices of scutum with numerous punctures; clypeus with a yellow spot .. *dupla dupla* Say (p. 503)

Area between notaulices of scutum polished, with few if any punctures; clypeus maculated or not .... *calcarata* Robertson (p. 502)

Males

1. Carinate apex of tergum 7 composed of two widely separated, acute tubercles ..... *cockerelli* H. S. Smith (p. 501)

Apex of tergum 7 with a single, median, lobe-like carina 2

2. Hind femur somewhat dilated toward base, but without a median projection, the greatest width near the base hardly more than a third its length 3

Hind femur with a median, triangular projection, width at this point about equal to half the length 4

3. Color deep blue; tergum 3 more closely punctate, interspaces no greater than diameter of punctures; carina of tergum 7 broadly rounded, subtruncate medially ..... *dupla floridana* new subspecies (p. 505)

Color usually more greenish; tergum 3 less closely punctate, interspaces considerably greater than diameter of punctures; carina of tergum 7 more regularly rounded .... *dupla dupla* Say (p. 503)

4(2). Carina of tergum 7 very narrow, fully as long as broad, and not over a fourth as broad as the tergum .... *metallica* H. S. Smith (p. 506)

Carina of tergum 7 at least twice as broad as long, fully half as broad as width of the tergum .... *calcarata* Robertson (p. 502)

Ceratina (Ceratinula) cockerelli H. S. Smith

(Figs. 122 and 124)

Ceratina lunata H. S. Smith, 1907. Amer. Ent. Soc. Trans. 33, p. 119. ♂ ♀. Preocc.

Ceratina cockerelli H. S. Smith, 1907. Canad. Ent. 39, p. 260. (new name)

FEMALE—Length 3.5-4.5 mm.; general body color black, clypeus with a median, oblong, yellow maculation; legs piceous basally, outer surface of front tibiae ivory, the tarsi yellow; mid and hind tibiae relatively dark, with rather small and obscure, basal, yellowish maculations, the tarsi becoming yellowish apically, spurs pale yellow; tubercles ivory; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to piceous; cheeks about equal to eyes in width, somewhat swollen below; clypeus quite flat, its median length about equal to apical width; mandibles tridentate apically; eyes slightly convergent below; segments 2-6 of flagellum somewhat broader than long; surface of head and thorax largely polished, head impunctate except for a few punctures across vertex and along inner orbits; pleura with minute, slightly separated and rather vague punctures; scutum minutely punctate anteriorly and posteriorly; scutellum with very fine and rather close punctures; propodeum rather dull and finely tessellate; abdominal terga 1-2 smooth but rather dull, practically impunctate, with only a few very minute punctures across apex of 2, 3 with minute scattered punctures across base and over apical half, 4 and 5 largely covered with rather deep but very fine and quite close punctures; pubescence very short, thin and obscure, hardly evident, visible chiefly on thorax laterally and on legs, forming a whitish scopa on hind tibiae, and the more apical abdominal segments thinly whitish pubescent.

MALE—Length 3-4 mm.; general body color black, the clypeus largely yellow; labrum with a median, basal, yellow macuation and a pair of small, lateral maculations between clypeus and lower margin of eye; legs piceous basally, tarsi and spurs yellowish; front tibiae yellowish, outer surface pale ivory, and lower margin of femur narrowly yellow; mid and hind tibiae brownish-testaceous, narrowly yellow basally; tubercles ivory, the tegulae more testaceous; wings subhyaline, becoming faintly clouded apically, veins testaceous; cheeks somewhat narrower than eyes, somewhat swollen below; clypeus quite flat, median length about equal to apical width; eyes slightly convergent below; mandibles bidentate apically; segments 2-5 of flagellum considerably broader than long; hind femora slightly dilated toward base but not angulate; carina of tergum 7 produced on each side to form an acute, rather slender spine; surface of head quite smooth, polished in large part, a few punctures evident on vertex; pleura with some minute, rather vague and sparse punctures. the scutum minutely punctate anteriorly, scutellum with very minute, well separated punctures, propodeum minutely tessellate; abdominal terga somewhat roughened, discs of 1 and 2 without evident punctures, 3 with some

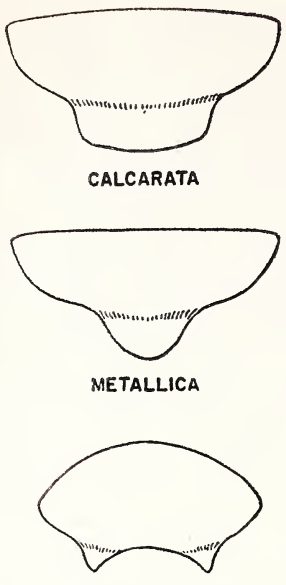


Figure 122
Tergum 6 in males of *Ceratina*.

minute punctures across the apical third, 3-5 with quite distinct, very fine and rather close punctures; pubescence extremely short, thin and obscure, hardly evident, visible chiefly on mid and hind legs and on the more apical abdominal segments; apical margin of sternum 6 deeply cleft medially, with a minute, peg-like tubercle at its base; basal stem of sternum 7 quite elongate, strongly compressed and keel like, the lateral arms very slender; gonocoxites of genital armature slender apically, strongly flexed toward mid-line, the tips approximate.

DISTRIBUTION—Georgia and Florida, January to September.

FLOWER RECORDS—*Bidens*, *Erigeron*, *Euphorbia* and *Polygala*.

Ceratina (Zadontomerus) calcarata Robertson

(Figs. 122-125)

Ceratina calcarata Robertson, 1900. Acad. Sci. St. Louis, Trans. 10, p. 54. ♂.
Ceratina calcarata Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 184. (biology)
Ceratina calcarata Rau, 1928. Ent. Soc. Amer. Ann. 21, p. 380. (biology)
Zadontomerus calcaratus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Ceratina calcarata Krombein, 1960. Ent. News 71, p. 68. (biology)

FEMALE—Length 6.5-8 mm.; general body color bluish to blue-green, clypeus either largely black or with a median, subapical, ivory maculation; antennae somewhat more piceous apically; legs basally metallic blue-green, becoming darker on tibiae, tarsi becoming brownish-testaceous apically, spurs pale testaceous; tegulae brownish-testaceous; wings lightly infuscated, veins testaceous to piceous; cheeks very slightly narrower than eyes; clypeus quite flat, its median length somewhat more than half the apical width; mandibles distinctly tridentate apically; clypeus smooth and impunctate medially, becoming rather sparsely punctate on each side; face laterally with rather coarse, close punctures, but surface shining and largely impunctate just below antennae, and a shining impunctate area below ocelli, punctures otherwise quite coarse and deep, irregularly scattered, becoming fine and very sparse on cheeks laterally and below; punctures of thorax much finer than those on face, scutum sparsely punctate between notaulices, with only a few punctures along mid-line, becoming closely punctate anteriorly and posteriorly; scutellum finely and quite sparsely punctate medially; punctures of pleura considerably coarser, deeper and well separated, those on propodeum laterally very fine and densely crowded, becoming shallow and obscure posteriorly, dorsal face rather narrowly and finely striate along upper margin; punctures of abdominal terga rather fine but distinct, quite sparse medially, becoming close laterally on 2 and 3, and closer on the more apical terga; pubescence entirely pale, very short, thin and inconspicuous, somewhat more conspicuous and elongate on mid and hind legs.

MALE—Length 5-7 mm.; general body color blue-green, clypeus largely ivory, only narrowly greenish on each side above; labrum with a quadrate, median, yellow maculation; antennae piceous to black; legs blackish with metallic reflections, tarsi becoming testaceous apically, spurs pale yellowish; tegulae testaceous-hyaline; wings lightly infuscated, veins testaceous to piceous; cheeks much narrower than eyes; clypeus quite flat, its median length considerably greater than half the apical width; mandibles bidentate apically, having a small, subapical tooth on lower margin; segments 2 and 3 of flagellum considerably broader than long; hind femora conspicuously angulate beneath, median width about one half the length; carina of tergum 7 broadly rounded, fully twice as broad as its

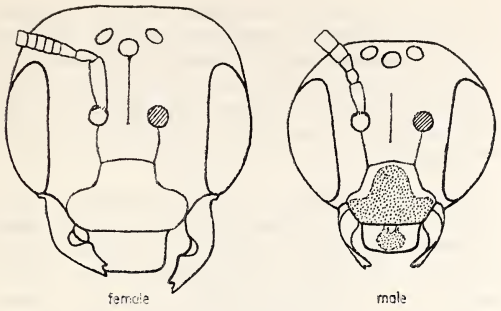


Figure 123
Facial view of head in male and female of *Ceratina calcarata*.

median length; clypeus largely impunctate, face shining between the coarse and deep punctures, these rather close below antennae, becoming more irregular and sparse above, shallow and rather close on cheeks above, becoming quite sparse below; punctures of thorax much finer than those on head, sparse on scutum between notaulices, becoming close anteriorly and posteriorly; scutellum rather flat, finely and rather closely punctate, punctures only slightly separated anteriorly; coarser but deep, distinct and quite close on pleura; minute on propodeum, densely crowded on lateral faces, rather obscure on the more shining posterior face, dorsal area very finely and closely striate along upper margin; punctures of abdominal terga fine, well separated across median areas of 2-4, interspaces considerably exceeding diameter of punctures; pubescence very short, thin and obscure, more evident on thorax laterally and on legs, tergum 6 with a rather dense, median, subapical tuft of short pale hairs; apical margin of sternum 6 with a median cleft bearing a pair of peg-like processes and a shorter median process; sternum 7 Y-shaped, its basal stem rather short, the latero-apical arms very slender (as shown); sternum 8 and genital armature as shown (fig. 124).

DISTRIBUTION — Quebec and Maine, south to Missouri and Georgia. March to October.

FLOWER RECORDS — *Apocynum, Chrysanthemum, Chrysopsis, Crataegus, Fragaria, Geranium, Haplopappus, Hydrangea, Ilex, Malus, Prunus, Pyracantha, Rubus, Salix, Salvia, Taraxacum* and *Vaccinium*. Robertson (1929) records *calcarata* on the following: *Antennaria, Arabis, Aruncus, Aster, Blephilia, Cacalia, Camassia, Cardamine, Cercis, Claytonia, Collinsia, Cypripedium, Dirca, Ellisia, Erigenia, Erigeron, Eulophus, Geum, Gillenia, Hepatica, Isopyrum, Lepidium, Osmorrhyza, Oxalis, Polemonium, Potentilla, Ranunculus, Rhus, Rudbeckia, Sanguinaria, Smilacina, Taenidia, Verbena, Viola* and *Zanthoxylum*.

Ceratina (Zadontomerus) dupla dupla Say

(Fig. 125)

Ceratina dupla Say, 1837. Boston Jour. Nat. Hist. 1, p. 397. ♀ (♂ misdet.)
Halictus Ontariensis Provancher, 1882. Nat. Canad. 13, p. 203. ♂.
Ceratina dupla Angus, 1869. Amer. Nat. 2, p. 49. (biology)
Ceratina dupla Ashmead, 1894. Psyche 7, p. 25. (biology)
Ceratina dupla Comstock and Comstock, 1895. Manual for Study of Insects, p. 669. (biology)
Ceratina dupla Packard, 1897. N. Y. Ent. Soc. Jour. 5, p. 112. (biology)
Ceratina dupla Graenicher, 1905. Ent. News 16, p. 43. (biology)
Ceratina dupla Graenicher, 1905. Wis. Nat. Hist. Soc. Bul. 3, p. 158. (biology)
Ceratina dupla var. *halophila* Cockerell, 1911. Canad. Ent. 43, p. 390. ♀.
Ceratina dupla Hicks, 1926. Colo. Univ. Studies 15, p. 250. (biology)
Ceratina dupla Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Ceratina (Zadontomerus) dupla Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1063. (larva)

FEMALE—Length 6-8 mm.; general body color blue-green, clypeus with an oblong, median, ivory maculation, antennae brownish-piceous apically beneath; legs greenish basally, the apical tarsal segments becoming brownish-testaceous, spurs pale yellowish, and front tibiae with a small, basal, ivory spot; tubercles with a small posterior ivory maculation; tegulae testaceous-hyaline; wings very lightly infuscated, veins testaceous to piceous; cheeks slightly narrower than eyes; mandibles distinctly tridentate apically; clypeus quite flat, its median length about two-thirds the apical width; segments 2-5 of flagellum distinctly broader than long; maculated area of clypeus smooth and impunctate, lateral greenish areas shallowly and coarsely punctate, face otherwise quite coarsely and rather closely punctate, with a limited impunctate area below each antenna, and punctures between ocelli and antennae rather sparse, cheeks rather finely and closely punctate above, becoming

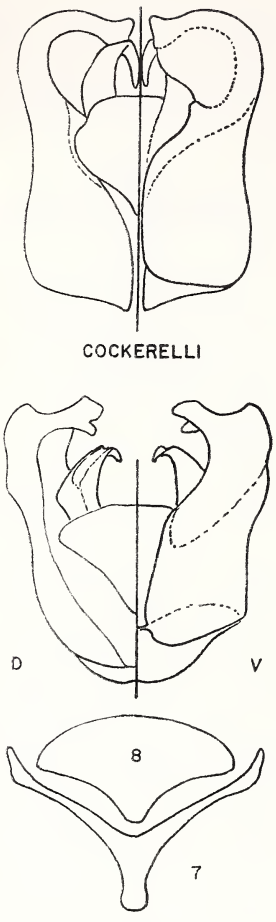


Figure 124
Sterna 7 and 8, and genital armature in male of *Ceratina calcarata*, and armature of *C. cockerelli*.

very sparsely punctate laterally and below; thorax more finely punctate than head, the scutum quite sparsely so between notaulices, with numerous punctures medially and toward the notaulices, becoming quite closely punctate anteriorly and posteriorly; scutellum with well separated, deep and somewhat finer punctures medially, becoming more finely and densely punctate along the margin; pleura quite coarsely and deeply punctate, the punctures close above, becoming rather sparse below; lateral faces of propodeum very finely and densely punctate, the posterior face becoming somewhat more shining and more sparsely but rather vaguely punctate, dorsal area rugoso-striate along margin, lower margin narrowly impunctate and quite smooth; punctures of abdominal terga quite deep and distinct but rather fine, quite close in general, but well separated medially and on discs of 2-4, interspaces much exceeding diameter of punctures; pubescence very short, thin, hardly evident except on thorax laterally, on legs, and to some degree on the more apical abdominal segments.

MALE—Length 6-7 mm.; general body color blue-green, clypeus ivory in large part, narrowly greenish laterally, the labrum with a small, submedian, ivory maculation; antennae more brownish beneath, piceous above; legs largely metallic greenish, the apical tarsal segments becoming brownish-testaceous, basal half of front tibiae with an ivory stripe on outer face; mid and hind spurs pale testaceous; tubercles ivory; tegulae yellowish-hyaline; wings very lightly infuscated apically, veins testaceous to piceous; cheeks slightly narrower than eyes; clypeus quite flat, its median length about two-thirds the apical width; mandibles obscurely bidentate apically, having a small, subapical tooth on lower margin; segments 2-4 of flagellum somewhat broader than long; hind femora somewhat dilated toward base but not angulate, the length more than twice the maximum width; carina of tergum 7 quite evenly rounded, the median length only slightly less than basal width; clypeus somewhat roughened but not distinctly punctate except at extreme sides; face shining, punctures coarse, deep and quite close below, rather sparse just below antennae and in a limited shining area below ocelli, otherwise quite close on face and vertex above, becoming shallow and quite sparse on cheeks laterally and below; punctures of thorax considerably finer than those on head, the scutum rather sparsely punctate medially, becoming quite closely punctate anteriorly and posteriorly; scutellum with somewhat finer and quite close punctures throughout; punctures of pleura rather coarse and subcontiguous; propodeum very finely and densely punctate laterally, posterior face rather coarsely, vaguely and shallowly punctate, the dorsal area rather coarsely reticulate, its lower margin narrowly impunctate; punctures of abdominal terga quite deep and distinct, rather fine, close in general but interspaces on terga 2 and 3 considerably greater than diameter of the punctures; pubescence entirely pale, very short, thin and inconspicuous, more evident on thorax laterally and on legs; apical margin of sternum 6 with a deep median cleft bearing a more lateral pair of peg-like processes and a shorter, finer median pair; sternum 7 and genital armature much as in *calcarata* (fig. 124).

DISTRIBUTION—Michigan to Maine, south to Mississippi and Florida, through-

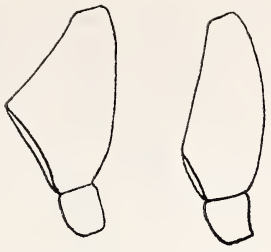


Figure 125
Hind femur in males of *Ceratina*.

out the year in Florida, elsewhere March to August.

FLOWER RECORDS—*Daucus, Erigeron, Fragaria, Galactia, Geranium, Helenium, Malus, Medicago, Melilotus, Oenothera, Oxalis, Pycnanthemum, Rubus, Salix, Salvia, Senecio, Spiraea,* and *Stachys.* The following additional records are given by Robertson (1929): *Amelanchier, Ammannia, Amorpha, Anemonella, Antennaria, Arabis, Arctium, Aruncus, Asclepias, Aster, Bidens, Blephilia, Brauneria, Cacalia, Camassia, Cardamine, Ceanothus, Cephalanthus, Cerastium, Chrysanthemum, Circaea, Cirsium, Claytonia, Collinsia, Convolvulus, Coreopsis, Cornus, Crataegus, Cryptotaenia, Cypripedium, Delphinium, Dentaria, Dianthera, Diospyros, Dirca, Ellisia, Erigenia, Eryngium, Erythonium, Eupatorium, Gerardia, Gillenia, Hedeoma, Helianthus, Heliopsis, Heracleum, Houstonia, Hydrangea, Hydrophyllum, Hypoxis, Isopyrum, Krigia, Lactuca, Leonurus, Lepidium, Liatris, Lithospermum, Lobelia, Lycopus, Lythrum, Malva, Marrubium, Monarda, Nelumbo, Nepeta, Pastinaca, Pentstemon, Petalostemum, Phyrma, Polemonium, Polygonatum, Polygonium, Potentilla, Prunus, Prunella, Psoralea, Ptelea, Ranunculus, Rhamnus, Rhus, Rosa, Rudbeckia, Sabatia, Sagittaria, Sambucus, Scrophularia, Scutellaria, Sida, Silphium, Smilax, Solidago, Specularia, Stellaria, Teucrium, Tradescantia, Trifolium, Triosteum, Verbena, Verbesina, Vernonia, Veronica, Viburnum, Viola* and *Zizia.*

Certina dupla floridana
new subspecies

FEMALE—Length 5.5-8 mm.; deep blue, clypeus with a median, elongate, ivory maculation, legs bluish basally, apical tarsal segments becoming brownish-testaceous, spurs pale testaceous, basal half of front tibiae with an outer ivory stripe; the mid and hind tibiae with very small ivory basal maculations; cheeks, mandibles, clypeus and antennae much as in *dupla* s. str.; puncturation somewhat closer, the abdominal terga very closely and distinctly punctate, interspaces on 2 and 3 no greater than diameter of the punctures; wings rather deeply infuscated apically, veins pale testaceous to piceous.

MALE—Length 5-7 mm.; general body color deep blue, clypeus largely ivory, labrum with a small, median, ivory maculation; legs dark basally, more or less metallic, apical tarsal segments becoming brownish-testaceous; spurs pale yellow, the anterior tibia with a narrow ivory stripe along the basal half of outer margin; tegulae testaceous-hyaline; wings rather deeply infuscated apically, veins testaceous to piceous; cheeks, mandibles, antennae and hind femora much as in *dupla* carina of tergum 7 somewhat broader, the median length only about half the basal width; punctures of head and thorax much as in *dupla* but discs of abdominal terga more closely punctate, interspaces on 2 and 3 no greater than the diameter of punctures; sterna 6 and 7, and genital armature as in typical *dupla.*

TYPES — Holotype: Male, Tarpon Springs, Fla., March 21, 1950 (H. A. Howden). Allotype: topotypical (H. K. Townes) [both author's coll.]. Paratypes: FLORIDA: 3 ♂ ♂, topotypical (Howden and Townes); 3 ♂ ♂, 2 ♀ ♀, Miami, Sept. 10, Dec. 22 and 23, and Feb. 10, 1916 and 1917; 1 ♂, 7 ♀ ♀, Larkins, Sept. 11, Dec. 8-14, Feb. 19-24 and March 21, 1921-1926, on *Chrysopsis, Galactia, Opuntia, Poinciana* and *Sinapis* (all Graenicher); 1 ♂, 2 ♀ ♀, Collier Co., Apr. 6, 1959, on *Senecio;* 2 ♀ ♀, Matheson Hammock, Dade Co., Apr. 8, 1959; 3 ♀ ♀, Key Largo, Apr. 11, 1959; 5 ♀ ♀, Highland Hammock St. Pk., Apr. 5, 1959 on *Bidens;* 1 ♀, Sanibal, Mar. 22, 1954; 4 ♀ ♀, Flagler Beach, Sept. 2, 1949; 7 ♀ ♀, Ft. Myers, Mar. 21, 1954, on *Cirsium;* 5 ♀ ♀, Alachua Co., Apr. 12, 1955, on *Rubus* (all Mitchell); 6 ♂ ♂, 22 ♀ ♀, Lake Co., Mar. 14 and 24, Apr. 6 & 8, 1956, on *Erigeron quercifolius, Salvia lyrata* and sweeping weeds (R. A. Morse); 1 ♀, Volusia Co., July 25, 1954; 1 ♂, 1 ♀, Alachua Co., Mar. 14, 1954 and Mar. 24, 1956, on *Medicago lupulina* (H. V. Weems, Jr.); 1 ♂, 1 ♀, Alachua Co., May 8, 1955, on *Stokesia laevis;* 2 ♂ ♂, 8 ♀ ♀, Alachua

Co., Apr. 13 and 27, 1955, Mar. 7 and Apr. 2 & 17, 1956, on *Melilotus alba;* 1 ♂, 15 ♀ ♀, Alachua Co., Apr. 16 & 17, 1956, on *Stachys floridana;* 2 ♀ ♀, Gainesville, May 28 and 29, 1955, on *Stokesia laevis;* 3 ♀ ♀, Marion Co., Apr. 6 and 17, 1956, on *Erigeron quercifolius;* 2 ♂♂, 6 ♀♀, Gainesville, Apr. 13, on *Stachys floridana,* and Oct. 31, 1956, on *Aster* and *Bidens pilosa* (all R. A. Morse); 1 ♀, Gainesville, Apr. 26, 1959; 2 ♂♂, 3 ♀♀, Merritt Is., Mar. 12, 1956; 1 ♂, Sarasota Co., June 4, 1954; 3 ♂♂, Key Largo, Dec. 26, 1954, Mar. 27, 1957 and Feb. 26, 1956; 5 ♀♀, Key Largo, Apr. 11, 1959, on *Emilia coccinae;* 3 ♀ ♀, Collier Co., Apr. 6, 1959, on *Cirsium;* 1 ♀, Stock Is. Dec. 27, 1954, on *Flaveria linearis;* 1 ♀, St. Johns Co., Sept. 3, 1955, on *Helianthus;* 3 ♀♀, Levy Co., Nov. 13, 1955, on *Bidens mitis,* and Apr. 14, 1955, on *Erigeron quercifolius* (all H. V. Weems, Jr.); 1 ♂, 18 ♀♀, Jacksonville, Mar. 30-Apr. 6, 1957, Apr. 12-May 25, 1958, and Aug. 9, 1958 (Dave Ribble); 1 ♀, Loxahatches, Palm Beach Co., Mar. 20, 1955 (R. R. Driesbach); 1 ♀, Fort Myers, Feb. 19, 1937; 1 ♀, Homestead, Apr. 1, 1939 (both J. C. Bradley) NORTH CAROLINA: 1 ♂, Beaufort, May 2, 1947, on *Ilex;* 1 ♀, Beaufort, June 9, 1931; 1 ♀, Burgaw, May 18, 1950, on *Oenothera;* 1 ♀, Wrightsville, July 8, 1953; 1 ♀, Holly Shelter, Pender Co., Oct. 9, 1954 (all Mitchell). SOUTH CAROLINA: 3 ♀ ♀, Edesto Beach, Aug. 31, 1949 (Mitchell). GEORGIA: 1 ♀, Thalman, June 3, 1922 (Mitchell); 1 ♀, St. Simon Isl., Apr. 22-May 12, 1911; 1 ♀, Unadilla, June 25, 1910 (both J. C. Bradley).

Paratypes are in collections of Cornell University, the North Carolina Department of Agriculture, the Florida Plant Board, the U. S. National Museum, R. R. Dreisbach, David Ribble and the author.

Ceratina (Zadontomerus) metallica H. S. Smith
(Fig. 122)

Ceratina metallica H. S. Smith, 1907. Amer. Ent. Soc. Trans. 33, p. 121. ♂.
Ceratina metallica Michener, 1937. Ann. Mag. Nat. Hist. (10) 19, p. 404. (taxonomy)
Ceratina metallica Krombein, 1960. Ent. News 71, p. 68. (biology)

FEMALE—Length 5-6.5 mm.; general body color blue-green, antennae becoming brownish apically, clypeus with a median, oblong, ivory maculation; mandibles somewhat reddish; legs piceous, with some metallic reflections, the apical tarsal segments becoming testaceous; basal two-thirds of front tibiae with an outer, ivory maculation; mid and hind tibial spurs pale yellowish; tegulae yellowish-hyaline; wings subhyaline, veins testaceous to brownish; tubercles bright yellow in both sexes; cheeks slightly narrower than eyes; clypeus quite flat, the median length somewhat more than half the apical width; mandibles distinctly tridentate at apex; antennal segments 2-5 considerably broader than long; clypeus largely impunctate medially, with some irregular, scattered punctures on each side; face shining, an impunctate polished area below ocelli, punctures otherwise rather coarse but irregular, rather close on each side below, those in median area sparse in general, becoming closer above on vertex, close and fine on cheeks above, very sparse and minute below; thoracic punctures much finer than those on head, scutum quite sparsely punctate between notaulices, becoming rather closely punctate anteriorly and posteriorly; scutellum with fine, well separated punctures, those on pleura somewhat coarser but well separated; lateral faces of propodeum minutely and densely punctate, becoming more shallow and obscure but still close posteriorly, dorsal area narrowly striate along upper margin; punctures of abdominal terga fine, but deep and distinct, well separated medially on 2-4 where interspaces are considerably greater than diameter of punctures; pubescence entirely pale, very short and thin, somewhat more evident on thorax laterally, on legs, and on the more apical abdominal terga.

MALE—Length 4.5-5 mm.; general body color metallic blue-green, clypeus ivory except for the very narrow lateral margin, and labrum with a quadrate, median, ivory maculation; antennae brownish beneath, more piceous above; legs largely blackish, with metallic reflections, the apical tarsal segments becoming somewhat more brownish, front tibiae with an ivory stripe along outer margin nearly to tip; spurs pale yellow; tegulae testaceous-hyaline; wings hyaline, veins testaceous to brownish; tubercles bright yellow in both sexes; cheeks somewhat narrower than eyes; clypeus quite flat, median length somewhat less than apical width; mandibles with a small, subapical tooth on lower margin; segments 2 and 3 of flagellum much broader than long; clypeus nearly impunctate, punctures of face otherwise quite coarse but rather shallow, quite close below antennae, becoming somewhat deeper and not so close above, fine and sparse on cheeks below; thoracic punc-

tures much finer than those on head, quite sparse on scutum medially, well separated on scutellum medially, quite close over most of pleura, very fine and close on lateral faces of propodeum, becoming more sparse, shallow and obscure posteriorly, dorsal face narrowly and finely striate along upper margin; discs of abdominal terga with rather fine but deep and distinct punctures, quite close in general but interspaces across median portion of 2 and 3 somewhat greater than diameter of the punctures; hind femora conspicuously angulate beneath, width at this point fully half the length; carina of tergum 7 very narrow, its median length nearly equal to the basal width; pubescence entirely pale, very short, thin and inconspicuous; apical margin of sternum 6 with a deep, median emargination bearing a pair of short but robust, peg-like processes, and a more median, minute pair which are only partially separated; sternum 7 and genital armature much as in *calcarata* (fig. 124).

DISTRIBUTION—New York to Georgia and Louisiana, March to September.

FLOWER RECORDS—*Asclepias, Chrysanthemum, Fragaria, Geranium, Helianthus, Oenothera, Prunus, Rubus. Senecio* and *Vaccinium.*

Xylocopa Latreille

(Fig. 121)

Xilocopa Latreille, 1802. Hist. Nat. Fourmis, p. 432. Type: *Apis violacea* Linnaeus. Desig. by Latreille, 1810.

Xylocopa Latreille, 1802. Hist. Nat. Crust. Ins. 3, p. 379. Emend.

Xylocopa subg. *Schönherria* Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 207. Type: *Xylocopa micans* Lepeletier. Desig. by Sandhouse, 1943.

Xylocopa subg. *Xylocopoides* Michener, 1954. Amer. Mus. Nat. Hist. Bul. 104, p. 155. Type: *Apis virginica* Linnaeus. Orig. desig.

Xylocopa subg. *Neoxylocopa* Michener, 1954. Amer. Mus. Nat. Hist. Bul. 104, p. 157. Type: *Apis brasilianorum* Linnaeus. Orig. desig.

Xylocopa Hurd, 1955. Calif. Ins. Survey Bul. 4, pp. 35-72. (Calif. spp. and key to spp. of U. S.).

Xylocopa subg. *Notoxylocopa* Hurd. 1956. Amer. Mus. Novitates 1776, p. 2 Type: *Xylocopa tabaniformis* Smith. Orig. desig.

Xylocopa is a genus of large, robust bees, often confused with bumble-bees by the general public. Commonly they are to some degree metallic in color, the males more conspicuously so, and the face of the males has yellow maculations. The stigma in the front wing is very small, and the marginal cell is very narrow and elongate, the tip bent away from the costal margin. The clypeus is flat, and the rather short mandibles almost completely hide the labrum when closed. In the thorax the menanotum is vertical in position, forming a part of the posterior surface which is nearly at right angles to the dorsal surface. The basitarsi are fully as long as their corresponding tibiae, and the hind pair are well covered with scopal hairs.

These are wood-boring bees, excavating tunnels in soft woods for nesting sites, feeding the larvae on pollen and nectar.

There are only two species, with one subspecies, found in the Eastern United States.

KEY TO SPECIES

1. Males 2
   Females 4
2. Bright metallic green; tibiae and metatarsi with patches of pale pubescence ..... *micans* Lepeletier (below)
   Dark purplish black; legs entirely black pubescent 3
3. Pubescence of scutum entirely pale yellowish, a restricted central area bare *virginica virginica* (Linnaeus) (p. 510)
   Central bare area of scutum more extensive, with a marginal fringe of conspicuous, black pubescence ..... *virginica krombeini* Hurd (p. 511)
4(1). Metallic purplish blue; dorsum of thorax black pubescent ..... *micans* Lepeletier (below)
   Black, with faint metallic tints; dorsum of thorax yellow pubescent 5
5. Abdominal terga 5 and 6 with some rather conspicuous, white pubescence at each extreme side ..... *virginica krombeini* Hurd (p. 511)
   Terga 5 and 6 entirely black pubescent *virginica virginica* (Linnaeus) (p. 510)

Xylocopa (Schonherria) micans Lepeletier

(Figs. 126 and 127)

?Apis nasuta Christ, 1791. Naturg. Klassif. Nomencl. Ins. Bienen-, Wespen-, Ameisengeschl. 8, p. 130.

Xylocopa micans Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 208. ♂

Xylocopa vidua Lepeletier, 1841. Hist. Nat. Ins. Hym. 2, p. 210. ♀

Xylocopa purpurea Cresson, 1872. Amer Ent. Soc. Trans. 4, p. 284. ♀

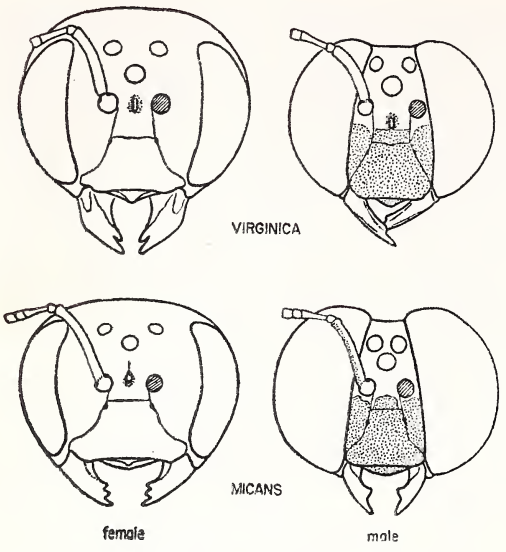


Figure 126
Facial view of head in males and females of *Xylocopa*.

FEMALE—Length 15-19 mm., breadth of abdomen 8-9 mm.; general body color black, with bluish or greenish reflections; wings lightly infuscated basally, becoming somewhat more deeply so apically, veins brownish to piceous; cheeks slightly narrower than eyes; clypeus flat, its median length about half the apical width, apical margin nearly straight; mandibles short, apical margin tridentate, not much narrower than the base; labrum much shorter than the breadth, with a small, median, basal tubercle, apical margin somewhat depressed below the median area; lateral ocelli subequally distant from eyes and each other, much more widely removed from margin of vertex which is very broad; basal segment of flagellum slightly shorter than segments 2-4 combined; punctures of face quite deep and distinct but rather fine, well separated on clypeus and supraclypeal area, somewhat closer toward eyes, surface densely tessellate, densely crowded just above level of antennae, becoming very sparse on vertex and on cheeks above, finer and closer on cheeks below; scutum with a median, shining, impunctate area, the punctures on each side quite deep and distinct but not very coarse, sparse toward median line, becoming quite close laterally; scutellum shining, punctures fine and quite sparse in general, becoming rather close along posterior margin; punctures of pleura quite deep, distinct, rather coarse and close throughout; propodeum dull and tessellate, without evident punctures; abdominal terga smooth, somewhat shining, punctures rather shallow but distinct, quite close laterally, becoming rather sparse medially on 2-5, the apical rims narrowly impunctate; pygidial area of 6 very narrow and elongate, rather poorly defined, punctures on each side rather coarse and close, becoming fine and crowded along lateral margins; hind tibiae with a median, carinate process on outer face; pubescence of head fuscous, very short but more or less erect, rather dense at sides of face and on cheeks below, the vertex practically bare; scutum bare medially, becoming rather copiously short pubescent laterally and anteriorly, largely fuscous but more or less intermixed with pale hairs; scutellum very sparsely pubescent, with a few scattered dark hairs, the posterior margin with a fringe of whitish pubescence; posterior face of propodeum more or less whitish pubescent, with a few intermixed dark hairs, lateral faces, entire pleura and legs black pubescent; abdominal terga 1-4 practically bare, tergum 1 with a small amount of pale pubescence at each extreme side, 4-6 with more or less erect, scattered, black hairs, becoming quite elongate and conspicuous on tergum 6, and terga 5 and 6 with conspicuous tufts of elongate whitish hairs laterally.

MALE—Length 16-19 mm., breadth of abdomen 8-9.5 mm.; general body color metallic green or blue, the clypeus, lateral face marks, lower half of supraclypeal area, and basal margin of labrum, bright yellow, maculations abruptly terminated at level of antennae; antennal scape narrowly yellow anteriorly; wings lightly infuscated, veins brownish to piceous; cheeks much narrower than eyes; clypeus flat, its median length nearly equal to the apical width, margin about straight; labrum much broader than the median length, subtruncate apically, margin deeply depressed below the somewhat swollen maculated basal area; mandibles quite short, rather slender, with a robust inner subapical angle or tooth; eyes strongly convergent above, nearly meeting at top of head, the lateral ocelli constricted into a narrow space considerably below top of the head; lateral portions of vertex practically eliminated, eyes occupying most of the upper surface of head; basal segment of flagellum distinctly longer than segments 2 and 3 combined, but shorter than 2-4; front trochanter with an acute posterior spine; hind tibiae with a small, submedian, carinate protuberance; punctures of lower half of face minute and well separated, median area of clypeus rather broadly impunctate, punctures above hardly evident except in the narrow space between upper end of eyes where they are rather fine and well separated; cheeks with fine and rather close punctures below; scutum with a median impunctate area that is shining

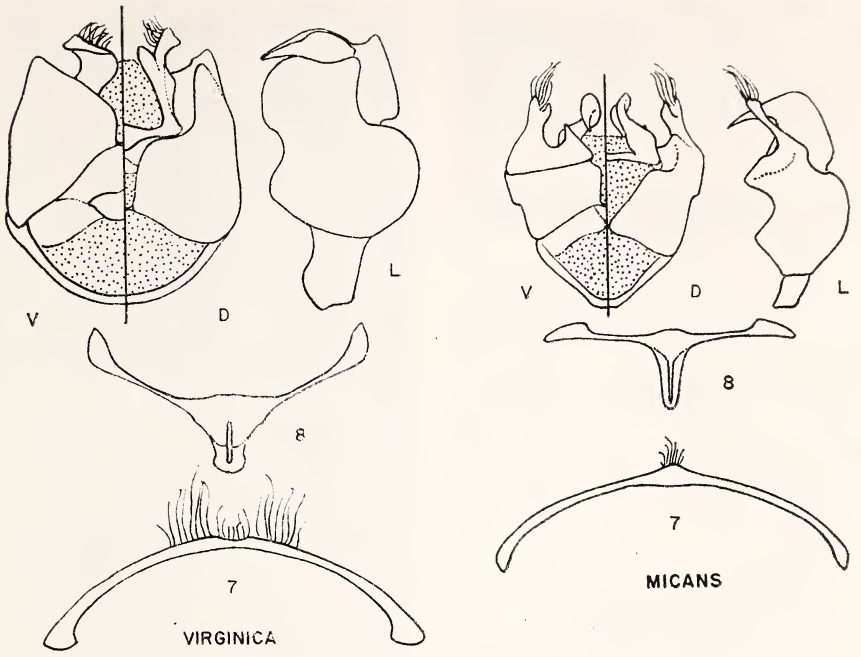


Figure 127—Dorsal (D), ventral (V), and lateral (L) views of male genital armature, and sterna 7 and 8 in *Xylocopa*.

and somewhat blackened, sparsely but coarsely and deeply punctate on each side, the punctures becoming rather fine and close laterally and anteriorly, this area greenish in color; scutellum bluish-green, shining, punctures fine and rather close posteriorly, becoming quite sparse anteriorly; pleura somewhat shining between fine, deep and distinct, rather close punctures; posterior face of propodeum shining and practically impunctate, lateral faces dull, tessellate, without distinct punctures; abdominal terga 1 and 2 green, becoming bluish apically on 2, with quite deep, distinct and rather close punctures; terga 3-6 blue, the punctures somewhat coarser and more sparse, tergum 6 rather finely punctate medially, becoming sparsely and copiously punctate laterally; apical margins of all terga narrowly shining and impunctate; pubescence of head short but rather dense, rather sparse on face below, yellowish over the maculated areas, with a few dark hairs at each extreme side, dark above antennae, yellowish and quite dense and elongate on cheeks, becoming fuscous above across posterior surface of head; scutum, scutellum and pleura largely covered with dense, rather short, bright yellowish pubescence, median area of scutum bare, with a few dark hairs evident, the metapleura and lateral surface of propodeum fuscous pubescent, and all the coxae quite densely yellowish pubescent; front tibiae and tarsi pale pubescent on outer surface, but tarsi with a rather dense posterior fringe of elongate hairs which are in part fuscous; mid tibiae yellowish pubescent on anterior half, the posterior black pubescent, the basitarsus yellowish pubescent over basal half, black on the apical half and following segments; hind tibiae with but one spur, the lower apical angle prolonged into a stout, slightly curved, shining process, yellow pubescent in general, with elongate hairs below, outer hairs more decumbent but quite dense, tarsi with some elongate pale hairs basally, becoming shorter and black apically; basal abdominal tergum largely yellowish pubescent, tergum 2 with short yellowish pubescence toward base and laterally, but with some short blackish pubescence on disc apically; terga 3-6 with thin, short, suberect black pubescence, 6 with some dense tufts of elongate, fuscous hairs laterally, with a few very elongate pale hairs intermixed, a somewhat similar but shorter tuft on 5 laterally and tergum 7 very densely fringed with fuscous, plumose hairs posteriorly, these slightly interrupted medially by a shorter more sparsely pubescent area; sterna 1-6 exposed, 7 and 8 retracted, form as shown, and genital armature as shown (fig. 127).

DISTRIBUTION — Southeastern Virginia to Florida, throughout the season.

FLOWER RECORDS—*Aesculus, Bidens, Cephalanthus, Cicuta, Galactia, Glycine, Hibiscus, Ilex, Ligustrum, Medicago, Melilotus, Phaseolus, Prunus, Rhus, Richardia, Senecio, Solanum, Solidago, Stachys, Suriana,* and *Vernonia.*

Xylocopa (Xylocopoides) virginica virginica (Linnaeus)

(Figs. 126 and 127)

Apis virginica Linnaeus, 1771. Mant. Plant. 2, p. 450.
Apis virginica Drury, 1773. Illust. Nat. Hist. Exotic Ins. 1 (index), p. 2.
Centris carolina Fabricius, 1804. Syst. Piez., p. 357. [♂]
Xylocopa virginica Angus, 1868. Amer. Nat. 1, p. 157. (biology)
Xylocopa virginica Walsh, 1868. Amer. Ent. 1, p. 9. (biology)
Xylocopa virginica Angus, 1869. Amer. Nat. 2, p. 49. (biology)
Xylocopa virginica Howard, 1892. Ent. Soc. Wash. Proc. 2, p. 331. (biology)
Xylocopa virginica Ashmead, 1894. Psyche 7, p. 23. (biology)
Xylocopa virginica Comstock and Comstock, 1895. Manual for Study of Insects, p. 670. (biology)
Xylocopa virginica Rau, 1926. Acad. Sci. St. Louis, Trans. 25, p. 162. (biology)
Xylocopa virginica Rau, 1929. Jour. Compar. Psychol. 9, p. 37. (biology)
Xylocopa virginica Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Xylocopa virginica Rau, 1931. Jour. Compar. Psychol. 12, p. 257. (biology)
Xylocopa (Schönherria) virginica Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1062. (larva)
Xylocopa (Xylocopoides) virginica Michener, 1954. Amer. Mus. Nat. Hist. Bul. 104, p. 155.

FEMALE—Length 19-23 mm., breadth of abdomen 9.5-10.5 mm.; entirely black, including antennae, legs, spurs and tegulae; wings rather deeply infuscated, veins brownish-piceous to black; cheeks broader than eyes; clypeus flat and slightly concave toward apical margin, median length about half the apical width, apical margin nearly straight; labrum much broader than long, with a robust, basal tubercle, median area elevated above the apical margin which is straight and with a conspicuous fringe of brownish setae; mandibles short, tapering apically, with a distinct, inner, subapical tooth, outer surface shallowly excavated at base; eyes subparallel; vertex broad, lateral ocelli much nearer each other than to its posterior margin, subequally distant from eyes and each other; face with a median carinate tubercle between antennae; basal segment of flagellum only slightly shorter than segments 2-4 combined; posterior margin of hind tibiae with a shallowly concave area that is delimited by a rather sharp carina, this angulate apically; punctures of face below and clypeus close and rather fine, quite deep and distinct, becoming somewhat more widely separated and sparse above, very sparse on vertex laterally and cheeks above, becoming relatively close and somewhat finer on cheeks below; scutum with a polished impunctate area medially, bordered with some very coarse, deep and rather sparse punctures which become very fine and close laterally and anteriorly; scutellum shining between deep, distinct, rather fine and close punctures, these somewhat separated along anterior margin; punctures of pleura rather fine but close and distinct; propodeum dull and tessellate, with scattered, sparse, shallow punctures; abdominal terga shining, punctures minute, widely scattered and sparse; tergum 6 with a median triangular pygidial area that is minutely and rather sparsely punctate, demarked by a series of short, robust, decumbent spines that converge apically, lateral areas of the tergum quite finely and closely punctate; pubescence of head short, erect, entirely blackish or fuscous, very thin on vertex, rather dense on sides of face and cheeks below; scutum, scutellum, pleura above and posterior face of propodeum densely yellowish or tawny pubescent, median area of scutum largely bare, the entire venter, pleura below, and legs black pubescent; basal abdominal tergum with a small amount of pale pubescence anteriorly, following terga practically bare, sterna with a small amount of rather short but erect black pubescence, becoming abundant and more elongate on the more apical segments, forming a rather dense apical fringe.

MALE—Length 17-21 mm., breadth of abdomen 7.5-9.5 mm.; black, with bluish or greenish reflections, the clypeus, lateral face marks, lower margin of supraclypeal area, and basal margin of labrum, bright yellow, these forming a nearly straight line just below level of antennae; wings rather lightly infuscated basally, becoming somewhat more deeply so apically, veins brownish-piceous to blackish; cheeks subequal to eyes in width; clypeus nearly flat, its median length about two-thirds the apical width; labrum much broader than its median length, subtruncate apically, the basal maculated area somewhat elevated; mandibles short and rather slender, with a conspicuous, superior, subapical angle; eyes rather strongly converging above, the

lateral ocelli in practical contact with inner margin of eyes; lateral areas of vertex practically eliminated, surface entirely occupied by eyes; basal segment of flagellum slightly shorter than segments 2-4 combined; hind tibiae with a very low, submedian, carinate process on outer surface, punctures on lower half of face minute and scattered, rather sparse on clypeus, quite close on lateral maculated areas, slightly coarser and deeper above, quite sparse between eyes above, rather deep and well separated on cheeks; scutum greenish, with a rather limited, median, shining and impunctate area, with a few sparse coarse, punctures on each side, these becoming fine and close laterally and anteriorly, and to a lesser degree across posterior margin; scutellum greenish, shining, punctures quite fine and close, becoming narrowly sparse along anterior margin; pleura shining between fine and rather close punctures; propodeum dull and tessellate, punctures shallow, irregularly scattered and rather sparse; basal abdominal tergum more greenish, punctures rather deep and distinct, well separated medially, becoming quite close laterally; punctures of the following terga somewhat finer and closer but deep and distinct, quite evenly distributed, but becoming somewhat closer toward lateral margins, somewhat more sparse apically on 4 and 5; pubescence of head erect and rather short, thin on face, rather copious between eyes and on cheeks and vertex, with intermixed pale and dark hairs; scutum, scutellum, lateral and upper faces of mesopleura, posterior face of propodeum and basal abdominal tergum quite densely covered with pale ochraceous pubescence, the thoracic venter and lateral areas of propodeum black or fuscous pubescent; legs in large part black pubescent, but front tibiae with some pale hairs in posterior fringe, the basitarsi with a quite prominant posterior fringe of pale hairs; pubescence of mid and hind legs entirely black; abdominal terga 2-7 entirely black pubescent, pubescence of the more basal of these very short, erect and quite dense but not at all obscuring the surface, that on 5-7 elongate and copious, forming a quite dense posterior fringe; sternum 7 transverse, linear in form and very slender, with a very shallow median emargination; sternum 8 broadly subtriangular, with slender lateral arms, apical margin nearly straight; genital armature as shown (fig. 127).

DISTRIBUTION — Kansas to the New England States, south to Texas and Florida, throughout the season.

FLOWER RECORDS — *Abelia, Bidens, Ilex, Lespedeza, Malus, Opuntia, Prunus, Rhus, Rubus, Solidago, Stachys* and *Vaccinium.* This has been recorded by Robertson (1929) on *Brauneria, Cornus, Melilotus, Petalostemum* and *Verbena.*

Xylocopa (Xylocopoides) virginica krombeini Hurd

Xylocopa (Xylocopoides) virginica krombeini Hurd, 1961. Amer. Ent. Soc. Trans. 87, p. 251. ♂ ♀.

This subspecies differs from the typical form chiefly in color of the pubescence. In the female abdominal terga 5 and 6 have a quite conspicuous tuft of white hairs at each extreme side, and the central bare area of the scutum has a marginal fringe of black pubescence. In males this marginal fringe on the scutum is more conspicuous than in the female, while the pale hairs of terga 5 and 6 may or may not be evident.

DISTRIBUTION — South Florida, throughout the year.

Table 17—Distribution of species of *Ceratina* and *Xylocopa* by states.

	New England						North Central						Mid Atlantic								South-eastern							
Ceratina	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
calcarata	X			X		X		X	X	X			X	X	X	X	X		X			X	X			X	
cockerelli																										X	X
dupla	X	X		X	X	X	X	X		X	X		X	X	X	X	X	X	X	X		X		X		X	X
d. floridana																						X	X			X	X
metallica				X			X	X		X	X	X	X	X		X			X		X	X		X		X	X
Xylocopa																											
micans																			X			X	X			X	X
virginica				X	X			X	X		X		X	X		X			X	X	X	X	X	X	X	X	X
v. krombeini																											X

FAMILY APIDAE

This family includes the truly social bees, in which a worker caste, more or less distinct from the queen, is found. These social bees are the honey bees, *Apis*, the bumbleebees, *Bombus*, and in the tropical regions two genera of stingless honeybees, *Melipona* and *Trigona*. Along with these are some non-social, non-parasitic, tropical genera such as *Euglossa* and *Eulema* which do not reach this region, and some parasitic groups, including *Psithyrus*, which is well represented in this part of the world.

In the non-parasitic genera the pollen-collecting surface of the hind tibiae is modified to form the so-called pollen-basket or corbicula, the surface being bare and highly polished, with a marginal fringe of elongate hairs. The scape is elongate, always much longer than the basal segment of the flagellum, and the pygidial plate is absent. In most of our species of *Psithyrus* and *Bombus*, the malar space is extensive, but this character is not constant throughout the family.

KEY TO GENERA

1. Hind tibial spurs absent; eyes conspicuously hairy ..... *Apis* (p. 544)
   Hind tibial spurs present; eyes not hairy 2
2. Females 3
   Males 4
3. Hind tibiae with well developed corbiculae ..... *Bombus* (below)
   Hind tibiae relatively slender, rather uniformerly pubescent throughout ..... *Psithyrus* (p. 538)
4. Hind tibiae somewhat flattened, rather sparsely pubescent on outer surface; gonostylus of genital armature very short, not much exceeding apex of gonocoxite ..... *Bombus*
   Hind tibiae more convex, quite densely pubescent on outer surface, gonostylus more elongate, much exceeding apex of gonocoxites ..... *Psithyrus* (p. 538)

Bombus Latreille

(Fig. 128)

Bremus Jurine, 1801. Intell. Blatt. Litt.-Ztg. Erlangen 1, p. 164. Name suppressed by Internatl. Comm. Zool. Nomencl., Op. 135, 1939. Type: *Apis terrestris* Linnaeus. Desig. by Morice and Durrant, 1915.

Bombus Latreille, 1802. Hist. Nat. Fourmis, p. 437. Type: *Apis terrestris* Linnaeus. Monob.

Bremus Panzer, 1804 (?). Faunae Ins. German., p. 85. Type: *Apis agrorum* Fabricius. Desig. by Sandhouse, 1943.

Bombus subg. *Leucobombus* Dalla Torre, 1880. Naturhistoriker, 2, p. 40. Type: *Apis terrestris* Linnaeus. Desig. by Sandhouse, 1943.

Bombus subg. *Megabombus* Dalla Torre, 1880. Naturhistoriker 2, p. 40. Type: *(Bombus ligusticus* Spinola) = *Apis argillacea* Scop. Monob. Desig. by Sandhouse, 1943.

Bombus subg. *Pyrobombus* Dalla Torre, 1880. (= *Pyrrhobombus)* Naturhistoriker 2, p. 40. Type: *(Apis) Bombus hypnorum* (Linnaeus). Monob. Desig. by Sandhouse, 1943.

Bombias Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 176. Type: *Bombias auricomus* Robertson. Orig. desig.

Bombus subg. *Terrestribombus* Vogt., 1911. Gesell, Naturf. Freunde Sitzber., p. 55 Type: *Apis terrestris* Linnaeus. Desig. by Frison, 1927.

Bombus subg. *Pratobombus* Vogt., 1911. Gesell. Naturf. Freunde Sitzber., p. 49. Type: *Apis pratorum* Linnaeus. Desig. by Frison, 1927.

Bombus subg. *Cullumanobombus* Vogt., 1911. Gesell. Naturf. Freunde Sitzber. p. 57. Type: *Apis cullumanus* Kirby. Desig. by Frison, 1927.

Bombus Franklin, 1913. Amer. Ent. Soc. Trans. 38, pp. 177-486. (revision).

Bombus Lutz and Cockerell, 1920. Amer. Mus. Nat. Hist. Bul. 42, pp. 502-544. (catalog).

Nevadensibombus Skorikov, 1922. Sta. Region. Protect. Plantes Petrograd Bull. 4, p. 149.

Alpigenobombus subg. *Fraternobombus* Skorikov, 1922. Sta. Region. Protect, Plantes Petrograd Bul. 4, p. 156. Type: *Apathus fraternus* F. Smith. Desig. by Frison, 1927.

Fervidobombus Skorikov, 1922. Sta. Region. Protect. Plantes, Petrograd Bul. 4, p. 153. Type: *Apis fervida* Fabricius. Desig by Frison, 1927.

Bremus subg. *Separatobombus* Frison, 1927. Amer. Ent. Soc. Trans. 53, p. 64. Type: *(Bombus separatus* Cresson) = *Apis griseocollis* Degeer. Orig. desig.

Bremus subg. *Rufocinctobombus* Frison, 1927. Amer. Ent. Soc. Trans. 53, p. 78, pl. xvii, fig. 9. Type: *Bombus rufocinctus* Cresson. Monob.

Bombus Plath, 1934. Bumblebees and their ways, 201 pp., New York, Macmillan. (biology)

Bombus, Megabombus and *Pyrobombus* Milliron, 1961. Kans. Ent. Soc. Jour. 34, pp. 55-58.

This is a native group of social bees in which the average size is considerably greater than in the honeybees. Both sexes are conspicuously and quite densely hairy insects. Females resemble the honeybee in having the outer surface of the hind tibiae bare and polished, with a marginal fringe of hairs forming the pollen basket or corbicula. In the males also the hind tibiae tend to be somewhat flattened, rather smooth and sparsely pubescent on the outer surface. In the front wing the marginal cell is rather short, separated from the apex of the wing by about its own length. In the hind wing the jugal lobe is absent. Usually there is a quite distinct and often extensive malar space separating the lower end of the eye from the mandible. The gonostyli of the male genital armature are very short in the majority of species, extending only slightly beyond the tips of the gonocoxites and penis valves.

In this region these bees are annually social with respect to the organization of the colonies. Newly fecundated queens hibernate during the winter, each one starting a new colony in the spring. The earlier broods that result from the nest-building, foraging and egg-laying activities of each queen are workers of small size, which assume much or all of the foraging and nest-building functions. Thereafter, as the numbers increase, there is an increase in body size of succeeding broods of workers. As the season progresses these more nearly approach the queen in size, and the distinction between the two castes in some species becomes obscure. Finally males and true queens are produced, which mate, and the cycle is repeated.

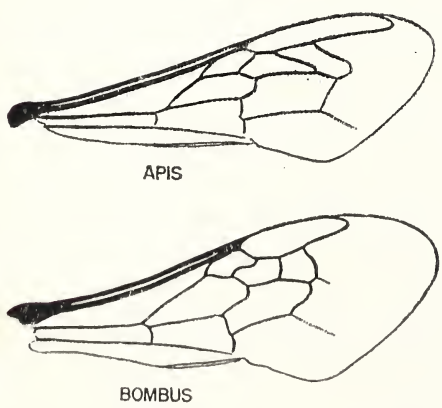


Figure 128
Venation of front wing in *Apis* and *Bombus*.

The species of *Bombus* occurring in North America do not represent a homogeneous group. They have affinities with those that occur in the Old World and those to the south. In consequence, a natural classification can be achieved only by inclusion of the species of these other regions in comprehensive taxonomic studies. Milliron (1961) indicates that there is evidence of a polyphyletic origin of the group, and therefore he recognizes three separate genera, including a total of five subgenera. All of the other numerous subgenera that have been proposed in the past are being reduced to synonymy. Although it is possible to distinguish these three genera according to the male genital armature, it is very difficult to do so according to the characteristics of the queens or workers. His work is still incomplete, and it has been deemed expedient to avoid the difficulties that would result if an attempt were made to separate these genera in this manual. Thus all the species here are assigned to *Bombus* in its original, all-inclusive sense, recognizing the fact that a division into smaller genera is probable in the future. The following table indicates the classification proposed by Milliron, with respect to the species of this area:

Bombus—affinis and *terricola*.
Megabombus
  Bombias—nevadensis and *n. auricomus*.
  Megabombus — borealis, fervidus and *pennsylvanicus*.
Pyrobombus
  Cullumanobombus—fraternus, griseocollis and *rufocintus*.
  Pyrobombus — bimaculatus, impatiens, perplexus, sandersoni, ternarius and *vagans*.

In the males, species assigned to *Bombus* may be recognized by the flared, dorsoventrally compressed and cup-shaped heads of the penis valves. In *Megabombus* these structures are straight, either simple or with abrupt, apically dilated heads, while in *Pyrobombus* they are conspicuously hooked, the curve of the hook directed toward the mid line.

The following keys to the species of

Bombus queens, workers and males have limitations due to the degree of variability in these bees. This is especially true of color patterns of the pubescence which are used extensively in the keys. To employ other characters would necessitate the use of more obscure features difficult to describe, or to observe or interpret. Moreover, to account for all the possible variations in color patterns would greatly increase the length and complexity of the keys. In consequence the form in which they appear is a compromise, and it is hoped and believed that they will facilitate identification of the great majority of specimens. A margin of error, however, should be recognized, and where accuracy of identification is of paramount importance, submission of specimens to experienced specialists is recommended.

KEY TO SPECIES

Queens

1. Lateral ocelli distinctly below supraorbital line 2
   Lateral ocelli located at or near level of supraorbital line 6

2. Malar space longer than width of mandible at base 3
   Malar space shorter than width of mandible at base 4

3. Posterior half of dorsum of thorax black pubescent ..... *nevadensis duricomus* (Robertson) (p. 520)
   Dorsum of thorax yellow pubescent throughout ..... *nevadensis nevadensis* Cresson (p. 521)

4(2). Dorsum of thorax usually with a conspicuous, transverse band of black pubescence between the wing bases 5
   Dorsum of thorax without an interalar black band, usually with a very small median area of black pubescence ..... *griseocollis* (Degeer) (p. 527)

5. Very large (20-25 mm.); lateral ocelli much below supraorbital line; abdominal terga 3-6 entirely black pubescent ..... *fraternus* (Smith) (p. 526)
   Smaller (less than 20 mm.); ocelli only slightly below supraorbital line; terga 3-6 yellow or fulvous pubescent in part ..... *rufocinctus* Cresson (p. 529)

6(1). Posterior half of scutum and all of scutellum black pubescent 7
   Posterior portion of dorsum of thorax with some yellow pubescence 8

7. Lateral ocelli considerably nearer eyes than to hind margin of vertex ..... *pennsylvanicus* (Degeer) (p. 524)
   Lateral ocelli subequally distant from eyes and margin of vertex, or nearer to margin to vertex ..... *terricola* Kirby (p. 519)

8(6). Dorsum of thorax with a transverse band of black pubescence, or posterior half of scutum black 9
   Dorsum of thorax without a transverse black band, with at most a small inconspicuous central black spot, largely yellow pubescent 14

9. Vertex broad, the lateral ocelli much nearer eyes than to its hind margin. 10
   Vertex narrower, the lateral ocelli subequally distant from its hind margin and the eyes, or nearer to the margin 12

10. Malar space considerably shorter than width of mandible at base; pubescence of abdomen fulvous in part ..... *rufocinctus* Cresson (p. 529)
    Malar space fully as long as width of mandible at base; abdominal terga 1-4 yellow pubescent 11

11. Pubescence of face, vertex and occiput largely yellow ..... *borealis* Kirby (p. 522)
    Pubescence of head largely black ..... *fervidus* Fabricius (p. 523)

12(9). Basal abdominal tergum entirely black pubescent, 2 & 3 entirely yellow, and 4-6 black ... *terricola* Kirby (p. 519)
    Basal tergum with considerable yellow pubescence 13

13. Pubescence yellow on abdominal terga 1-4, rufous on 2 and 3, black only on 5 and 6 ..... *ternarius* Say (p. 536)
    At least tergum 3 black pubescent ..... *sandersoni* Franklin (p. 534)

14(8). Pubescence of thorax laterally entirely yellow, that on tergum 3 entirely black 15
    Lower half of mesopleura with dark pubescence; or tergum 3 with some admixture of yellow pubescence ..... *perplexus* Cresson (p. 533)

15. Tergum 2 of abdomen entirely yellow pubescent 16
    Tergum 2 black pubescent at least in part 17

16. Malar space usually shorter than width of mandible at base; vertex with only a few pale hairs ..... *affinis* Cresson (p. 518)
    Malar space at least as long as width of

mandible at base; vertex with a tuft of yellow hairs .. *vagans* Smith (p. 537)

17(15). Tergum 2 of abdomen entirely black pubescent . *impatiens* Cresson (p. 532)
Tergum 2 entirely yellow pubescent, or at least with some basal yellow pubescence 18

18. Face entirely black; abdominal tergum 2 largely black pubescent, with a limited amount of yellow medially at base .... *bimaculatus* Cresson (p. 531)
Face with at least some light pubescence; tergum 2 yellow pubescent, sometimes with the apical margin narrowly black, or with scattered, intermixed black hairs toward margin .... *vagans* Smith (p. 537)

Workers

1. Lateral ocelli distinctly below supraorbital line 2
Lateral ocelli about at level of supraorbital line 5
2. Malar space fully equal in length to basal width of mandible; scutellum black pubescent .... *nevadensis auricomus* (Robertson) (p. 520)
Malar space much shorter than basal width of mandible; or scutellum yellow pubescent 3
3. Dorsum of thorax and abdominal terga 1-3 entirely and densely yellow pubescent; malar space fully equal to basal width of mandible ..... *nevadensis nevadensis* Cresson (p. 521)
Either scutum or tergum 3 with black pubescence; malar space much shorter than width of mandible at base 4
4. Dorsum of thorax with a distinct interalar black band; tergum 2 entirely covered with yellow pubescence .... *fraternus* (Smith) (p. 526)
Dorsum of thorax with no interalar band; tergum 2 narrowly black on apical margin, otherwise yellow, slightly tinged with brown .... *griseocollis* (DeGeer) (p. 527)

5(1). Scutellum and posterior half of scutum black pubescent 6
Scutellum largely or entirely yellow pubescent 7
6. Basal abdominal tergum entirely black pubescent; lateral ocelli nearer hind margin of vertex than to eyes .... *terricola* Kirby (p. 519)
Basal tergum yellow pubescent at least in part; lateral ocelli subequally distant from eyes and hind margin of vertex, or nearer the eyes .... *pennsylvanicus* (Degeer) (p. 524)

7(5). Dorsum of thorax largely pale pubescent, scutum with only a small median area of black pubescence, if any 8
Dorsum of thorax with considerable black pubescence, either with a distinct, interalar black band, or scutum largely black, being only narrowly yellow along anterior margin 13

8. Abdominal terga 2-6 entirely black pubescent, with only tergum 1 yellow; malar space shorter than basal width of mandible ..... *impatiens* Cresson (p. 532)
At least tergum 2 with some yellow pubescence 9
9. Tergum 2 largely black pubescent, but invaded by yellow along basal margin medially; malar space fully equal to width of mandible at base .... *bimaculatus* Cresson (p. 531)
Tergum 2 largely or entirely yellow pubescent 10
10. Lower half of thorax with dark pubescence; or tergum 3 yellow, at least in part ..... *perplexus* Cresson (p. 533)
Lower half of thorax yellow pubescent, tergum 3 black 11
11. Malar space fully equal to basal width of mandible .. *vagans* Smith (p. 537)
Malar space much shorter than basal width of mandible 12
12. Lateral ocelli slightly below supraorbital line; pubescence of tergum 2 rather short, tinged with brown, usually narrowly black along apical margin .... *griseocollis* (Degeer) (p. 527)
Lateral ocelli approximately on the supraorbital line; pubescence of tergum 2 yellow apically, with a distinct median notch, usually fulvous across base .... *affinis* Cresson (p. 518)

13(7). Malar space much shorter than basal width of mandible 14
Malar space at least nearly equal in length to basal width of mandible, or longer 17

14. Pubescence of tergum 3 entirely black, that on 2 yellow laterally and apically, with a distinct median notch, usually fulvous across the base .... *affinis* Cresson (p. 518)
Tergum 3 usually with yellow or fulvous pubescence; if all black, then not as above 15
15. Basal abdominal tergum entirely black pubescent .... *terricola* Kirby (p. 519)
Basal tergum yellow pubescent 16
16. Abdominal terga 2 and 3 with rufous pubescence, that on the pleura and basal tergum yellow; lateral ocelli nearer

hind margin of vertex than to eyes .. .. *ternarius* Say (p. 536)
Abdominal terga with no rufous pubescence; lateral ocelli subequally distant from eyes and hind margin of vertex ..... *rufocinctus* Cresson (p. 529)

17(13). Abdominal tergum 3 entirely yellow pubescent 18
Tergum 3 black pubescent 19

18. Pubescence of face, vertex and occiput largely yellow. .*borealis* Kirby (p. 522)
Pubescence of head entirely black .... *fervidus* (Fabricius) (p. 523)

19(17). Malar space slightly shorter than basal width of mandible .... *sandersoni* Franklin (p. 534)
Malar space fully as long as basal width of mandible .. *vagans* Smith (p. 537)

Males

1. Eyes usually converging above, the lateral ocelli nearer to margins of the eyes than to each other; malar space very short, length one-fourth or less the basal width of mandible 2
Eyes about parallel, the lateral ocelli distant from eye margin; malar space nearly or quite as long as basal width of mandible 6

2. Malar space exceedingly short, almost obliterated, eyes nearly touching base of mandibles, strongly convergent above ..... *fraternus* (Smith) (p. 526)
Malar space distinct, even though short, eyes somewhat removed from base of mandibles 3

3. Lateral ocelli near supraorbital line, separated from eye margin by a space greater than their diameter; eyes only slightly convergent above .... *rufocinctus* Cresson (p. 529)
Lateral ocelli much below supraorbital line, separated from eyes by less than their diameter 4

4. Eyes strongly convergent above, ocelli located midway between antennae and hind margin of vertex 5
Eyes nearly parallel, even though face very narrow, with ocelli nearer margin of vertex than to antennae .... *griseocollis* (Degeer) (p. 527)

5. Pubescence of legs and of abdominal terga 4-7 entirely black .... *nevadensis auricomus* (Robertson) (p. 520)
Posterior fringes of legs yellowish; abdominal terga 6 and 7 to some degree ferruginous ..... *nevadensis nevadensis* Cresson (p. 521)

6(1). Basal abdominal tergum black pubescent ..... *terricola* Kirby (p. 519)
Basal tergum yellow pubescent 7

7. Dorsum of thorax with a median transverse band of black pubescence between the wing bases 8
Dorsum of thorax entirely yellow pubescent, or with a median patch of black hairs that does not reach the tegulae 12

8. Pubescence of terga 3 and 4 black, at least in part .... *affinis* Cresson (p. 518)
Pubescence of terga 3 and 4 entirely yellowish 9

9. Abdominal terga 2-4 with some bright rufous pubescence, that on tergum 1 yellow, black on 5-7 .... *ternarius* Say (p. 536)
Terga 1-4 entirely yellow pubescent .. 10

10. Malar space not much longer than wide, about a fourth the length of the eye; abdominal tergum 5 usually black pubescent .... *pennsylvanicus* (Degeer) (p. 524)
Malar space considerably longer than wide, about one third the length of the eye; tergum 5 yellow pubescent 11

11. Interalar band quite narrow; head largely black pubescent; outer face of hind tibia convex, closely punctate .... *fervidus* (Fabricius) (p. 523)
Interalar band quite broad; vertex yellow pubescent, and face with some admixture of pale hairs; outer face of hind tibia flattened, sparsely punctate .... *borealis* Kirby (p. 522)

12(7). Pubescence of abdominal terga 1-4 usually pale yellow .... *perplexus* Cresson (p. 533)
At least tergum 3 with black pubescence 13

13. Outer surface of hind tibiae flattened, its central portion bare and polished; hairs on face entirely black .... *affinis* Cresson (p. 518)
Outer surface of hind tibiae rounded, well covered with hairs; face with considerable pale pubescence 14

14. Segment 2 of abdomen entirely black pubescent; malar space shorter than width of mandible at base .... *impatiens* Cresson (p. 532)
Segment 2 of abdomen with at least some yellow pubescence; malar space longer than width of mandible at base 15

15. Pubescence usually dark on each side of abdominal tergum 2; outer surface of hind tibiae rather dull, finely and rath-

er closely punctate and pubescent .... *bimaculatus* Cresson (p. 531)

Pubescence of tergum 2 entirely yellow; outer surface of hind tibiae polished and largely impunctate medially toward apex 16

16. Basal segment of flagellum not much longer than segment 2, distinctly shorter than segment 3 .... *vagans* Smith (p. 537)

Segments 1 and 3 of flagellum about equal, segment 2 considerably shorter .... *sandersoni* Franklin (p. 534)

Bombus affinis Cresson

Bombus affinis Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 103. ♀ ☿

Bombus affinis var. *novae-angliae* (Bequaert), 1920. Psyche 27, p. 6. ♂ ☿

Bombus affinis Plath, 1922. Psyche 29, pp. 190-192. (biology)

Bombus affinis Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 135. (biology)

QUEEN—Length 21-22 mm., breadth of abdomen 9.5-11 mm.; black, legs becoming somewhat more piceous apically, mid and hind spurs reddish-piceous, tegulae piceous to black; wings rather deeply and uniformly infuscated, veins brownish to piceous; pubescence copious and dense but rather short in general, entirely black on head, on venter of thorax, propodeum, and in large part on legs; pronotum, scutum, scutellum and pleura largely yellow pubescent, the scutum black in a rather restricted area posteriorly, with intermixed black and yellow hairs between this patch and tegulae; tarsal segments in part with very fine pale pruinose pubescence, this distinct, especially on hind basitarsi; corbicular fringe of rather elongate, blackish hairs; pubescence entirely yellow on abdominal terga 1 and 2, that on 2 with a somewhat reddish tinge at certain angles, entirely black on 4-6; clypeus finely and closely punctate laterally and above, broad median area shining, very sparsely and minutely punctate, becoming rather closely punctate along the narrow apical margin; labrum with a basal ridge which is interrupted medially, this area somewhat excavated, surface on each side considerably depressed, quite copiously covered with short yellowish hairs; apex of mandibles with a pair of inner teeth, the lower third rather deeply and roundly emarginate, forming a quite distinct ventral apical angle, outer face somewhat shining, minutely punctate; malar space smooth and shining, without evident punctures, its median length considerably less than basal width of mandibles, no more than one-sixth length of eye; punctures of face very fine and dense medially, becoming somewhat more distinct and coarse toward ocelli but still close, a limited, shining, impunctate area adjacent to each lateral ocellus; vertex very finely and densely punctate medially, becoming somewhat more distinctly but finely punctate laterally; antennal scape very slightly more than half total length of flagellum, basal segment of flagellum very slightly longer than segment 3, and 3 somewhat longer than 2; hind basitarsus quite broad, posterior margin slightly curved; tergum 6 smooth, rather narrowly rounded apically, punctures exceedingly minute and hardly evident.

WORKER—Length 11-16 mm., width of abdomen 5-8 mm.; pattern of pubescence and structure very similar to queen, but pubescence somewhat more copious and elongate, that on tergum 2 more deeply tinged with reddish or rufous.

MALE—Length 13-17.5 mm., breadth of abdomen 5-7 mm.; black, including legs and tegulae, spurs somewhat more reddish-piceous; wings lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga very narrowly yellowish-hyaline; pubescence long and copious in general, largely black on head but with a few pale hairs intermixed on vertex; posterior half of scutum with numerous dark hairs intermixed with light, forming an obscure, interalar band, thorax otherwise largely pale yellowish pubescent; basal segments of legs, including the femora, with long, more or less intermixed light and dark hairs, tibiae rather prominently fringed posteriorly with largely pale pubescence, with some darker, shorter hairs beneath, hind tibiae prominently fringed with elongate hairs, posterior fringe pale in part; abdominal terga 1 and 2 entirely pale pubescent, 3-7 black, in marked contrast; clypeus very finely and densely punctate beneath dense pubescence; labrum broadly truncate, somewhat rounded laterally, surface shining, irregularly and finely punctate; mandibles small and slender apically, distinctly bidentate, outer surface densely covered with yellowish, appressed tomentum, lower margin fringed with elongate, curved, more or less yellowish hairs; malar space smooth and shining, very vaguely and minutely punctate, its median length slightly greater than basal width of mandible, eye nearly five times as long; median area of face very finely and densely punctate, becoming somewhat more shining and sparsely punctate below ocelli, shining and largely impunctate between lateral ocelli and eyes; vertex dull, with very fine and close punctures, these becoming more sparse laterally; segments 1 and 3 of flagellum about equal, seg-

ment 2 considerably shorter; outer surface of hind tibiae quite flat, rather smooth, shining and largely impunctate, somewhat resembling corbicula of female; hind basitarsus slightly and gradually narrowed toward base; sterna 7 and 8 and genital armature resembling those in *terricola* (fig. 133).

DISTRIBUTION — Ontario to New Brunswick, south to North Carolina, April to October.

FLOWER RECORDS — *Aralia, Aster, Hydrangea, Malus, Robinia, Solidago* and *Vaccinium.*

Bombus terricola Kirby

(Fig. 133)

Bombus terricola Kirby, 1837. Fauna Bor.-Amer. 4, p. 273. ♀.
Bombus terricola Plath, 1922. Psyche 29, pp. 192-193. (biology)
Bombus terricola Plath, 1927. Psyche 34, pp. 122-124. (biology)
Bremus terricola Brittain and Newton, 1933. Canad. Jour. Res. 9, p. 343. (flower records)
Bombus terricola Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 138. (biology)

QUEEN—Length 17-19 mm., breadth of abdomen 9-10 mm.; black, apical tarsal segments somewhat more piceous, spurs reddish-piceous, tegulae black; wings uniformly and rather deeply infuscated, veins brownish to piceous; pubescence rather short, entirely black on head, yellow on pronotum, tubercles, adjacent area of pleura above, anterior margin of scutum, and abdominal terga 2 and 3, otherwise black including that on legs and on base of abdomen; scutellum yellow or black, or with varying degrees of intermixture; corbicular fringe of elongate, usually black hairs; hind basitarsi with very fine, appressed, pale pruinose hairs; clypeus finely and rather densely punctate laterally and above, the broad median area shining and more minutely and rather closely punctate; labrum rather broadly subtruncate, with a basal elevated ridge which is slightly interrupted medially, apical margin of this area broadly rounded, slightly elevated above margin on each side and fringed with rather elongate, yellowish hairs; apex of mandible with a rather broad and deep, rounded emargination toward the inferior angle, and a pair of distinct notches toward the upper angle, outer face toward base shining and very minutely, irregularly punctate; malar space smooth and shining, only very minutely and obscurely punctate, length slightly less than basal width of mandible, about one-fourth length of eye; punctures very fine and close on face medially, becoming somewhat more distinct but still close toward ocelli, surface laterad of ocelli rather narrowly shining and impunctate, becoming finely but rather distinctly punctate toward eye, vertex very densely and finely punctate medially, punctures becoming somewhat more distinct but still close laterally; lateral ocelli subequally distant from eyes, margin of vertex and each other; antennal scape approximately half total length of flagellum, basal segment of flagellum slighty longer than segment 3, and 3 slightly longer than 2 which is about as broad as long; posterior margin of hind basitarsus quite broadly outcurved, median breadth slightly more than one-third the length; tergum 6 smooth and shining, with exceedingly minute scattered and rather sparse punctures, apex narrowly rounded.

WORKER—Length 9-14 mm., breadth of abdomen 5-7 mm.; resembles queen in general, but pubescence relatively longer.

MALE—Length 13-17 mm., breadth of abdomen 6-8 mm.; black, apical tarsal segments somewhat more piceous, spurs brownish, tegulae piceous to black; wings lightly infuscated or subhyaline, veins brownish to piceous; pubescence copious and elongate in general, largely pale yellowish on clypeus, but with intermixed black hairs laterally, and chiefly black around antennae, vertex with pale yellowish hairs medially, more or less intermixed with black, especially laterally, cheeks with blackish pubescence above becoming somewhat paler below; pubescence pale yellowish on pronotum, tubercles, anterior margin of scutum, pleura in large part, and usually scutellum, fuscous on propodeum and black over posterior two-thirds of scutum; abdominal terga 2 and 3 with bright yellow pubescence, 1 and 5-6 largely black, sometimes with some pale hairs on 6 and 7 laterally and apically; basal segments of legs, including femora, with elongate, generally pale pubescence, dark on tibiae, with posterior fringes of rather elongate hairs which may be pale in part, hind tibiae fringed with elongate, intermixed, light and dark hairs; hind basitarsi nearly bare above, densely clothed beneath with very short, brownish-ochraceous hairs; clypeus very finely and closely but quite distinctly punctate beneath dense pubescence; labrum quite smooth and shining, with only very minute and vague punctures medially, broadly subtruncate apically; mandibles slender, distinctly bidentate apically, densely ochraceous pubescent on outer face, lower margin fringed with long, ochraceous or yellowish hairs; malar space shining, punctures very vague and minute, length about equal to basal width of mandible, about

one-fifth length of eye; median area of face very finely and closely punctate, the punctures becoming somewhat more distinct and more widely separated toward ocelli, surface laterad of ocelli shining and impunctate, punctures very fine and closely crowded on vertex medially, becoming somewhat more distinct laterally; lateral ocelli subequally distant from eyes, margin of vertex and each other; basal segment of flagellum subequal to segment 3, segment 2 somewhat shorter, about as broad as long; outer surface of hind tibiae rather flat, quite broad and entirely impunctate except toward the narrow margins; hind basitarsi gradually narrowed from center to base, which is very slightly broader than apex; sterna 7 and 8 and genital armature as shown (fig. 133).

DISTRIBUTION — In the East, Nova Scotia to Florida, April to October.

FLOWER RECORDS — *Rhododendron, Rosa, Rubus, Vaccinium* and *Vicia.* Brittain and Newton (1933) also record this species on *Lonicera, Phleum, Pinus(?). Pyrus malus* and *Salix.*

This species can be easily confused with *pennsylvanicus,* but in that species the malar space is somewhat longer, the scutellum in the queen and workers is always black pubescent, and the basal abdominal tergum is yellow at least in part. In males the abdominal terga 1-5 are yellow pubescent, contrasting with the limitation of yellow to terga 2 and 3 in *terricola.*

Bombus nevadensis auricomus (Robertson)

Bombias auricomus Robertson, 1903. Amer. Ent. Soc. Trans. 29, p. 176. ♀ ♂ ☿

Bombus auricomus Frison, 1917. Ent. Soc. Amer. Ann. 10, pp. 277-286. (biology)

Bombus auricomus Frison, 1918. Ent. Soc. Amer. Ann. 11, pp. 43-48. (biology)

Bombus auricomus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Bombus auricomus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 153. (biology)

Auricomus Group, Milliron, 1961. Kans. Ent. Soc. Jour. 34, p. 56.

QUEEN—Length 20-25 mm., breadth of abdomen 9.5-11 mm.; black, legs reddish-piceous, apical tarsal segments somewhat more brownish, spurs and tegulae reddish-piceous; wings quite deeply infuscated basally, becoming somewhat paler apically, veins testaceous to black; pubescence rather short but quite dense, largely black on head, but vertex with a transverse band of yellow pubescence, posterior margin fringed with black; pubescence yellow on pronotum, tubercles and anterior margin of scutum, otherwise blackish or fuscous on thorax, largely black on legs, corbicular fringe fuscous or black, hind basitarsi thickly clothed with more reddish pubescence beneath, the more apical tarsal segments of all thinly clothed with very short pale tomentum; propodeum posteriorly with a thin covering of short, subappressed, golden tomentum, and with erect, darker hairs; abdominal terga 2 and 3 with a dense covering of short, yellow pubescence, terga 1 and 4-6 entirely black; clypeus shining, with rather sparse, very minute punctures and scattered, coarser punctures, more numerous laterally and above; labrum broadly rounded, with a basal ridge which is slightly interrupted medially, with a dense median tuft of more or less erect, brownish hairs, apical margin considerably depressed; apex of mandibles with a broad, rounded, lower margin or cutting edge and a pair of inner, nearly apical, acute teeth (in unworn specimens), the outer face toward the base rather dull, with exceedingly minute, vague and close punctures; malar space smooth and shining, hardly punctate, its length somewhat greater than basal width of mandible; eye about three and one-half times that of malar space; ocelli distinctly below supraorbital line, lateral ocelli slightly nearer eyes than to each other, and nearer each other than to margin of vertex; total length of flagellum about twice that of scape, basal segment about equal to segments 2 and 3 combined; face finely and closely punctate, becoming shining and nearly impunctate adjacent to lateral ocelli; vertex densely and finely punctate medially, becoming shining and rather sparsely punctate laterally; scutum with a limited median posterior area that is shining and impunctate; hind basitarsus parallel-sided, width somewhat less than half the length; tergum 6 with a slight, median, apical ridge.

WORKER—Length 18-20 mm., breadth of abdomen 8-9 mm.; resembles queen except in size.

MALE—Length 17-20 mm., breadth of abdomen 8-9 mm.; black, apical tarsal segments somewhat more brownish-testaceous, mid and hind spurs piceous and tegulae reddish-piceous; wings rather uniformly and deeply infuscated, veins testaceous to piceous; pubescence short but quite copious and dense, pale yellowish on vertex and occiput, with some intermixed yellowish and black hairs on face medially, blackish on cheeks and lower part

of face; pubescence yellowish on scutum, scutellum and pleura, with a slight tawny tinge, scutum posteriorly with an intermixture of short, more fuscous hairs, that on scutellum more elongate and conspicuous on each side of a narrow, median, nearly bare line; pubescence fuscous on propodeum and venter along mid line; legs fuscous or blackish pubescent in general, mid and hind basitarsi with fringes of rather elongate, dark hairs, the more apical segments with very fine, more or less appressed, pale tomentum; abdominal terga 1-3 entirely yellow pubescent, this with a slightly reddish tinge at certain angles, the hairs quite short but dense, 4-7 entirely black, the hairs more elongate and erect except on 7 medially; eyes large and bulging, strongly converging above, lateral ocelli nearly contiguous with the inner margin, located about at mid-point between margin of vertex and antennae; clypeus finely and closely punctate in large part, apical margin somewhat more shining and more minutely and vaguely punctate; labrum rather broadly rounded or subtruncate apically, shining laterally, more densely and finely punctate medially; mandibles quite short and slender, bidentate apically, lower tooth rounded, upper tooth more acute, outer surface densely yellowish tomentose, lower margin with a fringe of elongate, dark hairs; malar space shining and nearly impunctate, short, its length only slightly more than half the basal width of mandibles; total length of flagellum somewhat more than twice length of scape, basal segment subequal in length to 2 and 3 combined; margins of hind basitarsi nearly parallel, the length somewhat more than twice the breadth; sterna 7 and 8 and genital armature as in *nevadensis* (fig. 130).

DISTRIBUTION — Minnesota to New York, south to Georgia, May to September.

FLOWER RECORDS—*Ceanothus*, *Hypericum*, *Malus* and *Rubus*.

Milliron (1961) finds that *auricomus* is only subspecifically different from *nevadensis*, and states in correspondence that all intergradations between the two forms are to be found. This is the more eastern form, while typical *nevadensis* occurs only sparingly east of the Mississippi.

Bombus nevadensis nevadensis Cresson

(Figs. 129 & 130)

Bombus nevadensis Cresson, 1874. Amer. Ent. Soc., Trans. 5, p. 102. ♀ ♂.

Bombus improbus Cresson, 1878. Acad. Nat. Sci. Phila. Proc., p. 186. ♂.

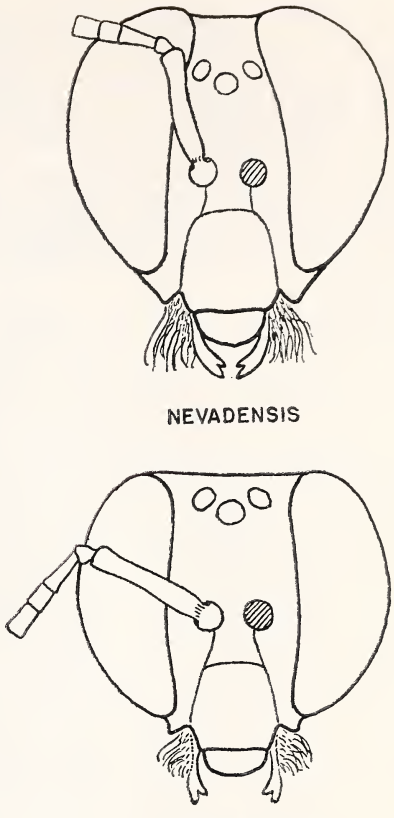


Figure 129
Facial view of heads in males of *Bombus*.

Bombus nevadensis race *cressoni* Cockerell, 1899. Ann. Mag. Nat. Hist. (7) 4, p. 388. ♀.

QUEEN—Pubescence of head entirely black, largely yellow on pronotum, scutum and scutellum, with a few black hairs in center of scutum, entirely black on pleura, propodeum and legs; abdominal terga 2 and 3 yellow, the basal tergum black at base, but yellow along apical margin of disc, 4-6 entirely black.

WORKER—Pattern of pubescence similar to that of queen.

MALE—Legs with posterior fringes of long, yellowish hairs, and tarsi with very short, yellowish pubescence; abdominal terga 1-3 and 6-7 with pubescence entirely yellow, that on 4-5 largely black, but becoming more or less yellowish laterally and apically.

DISTRIBUTION — Western United States, from Pacific coast to Illinois.

Bombus borealis Kirby

(Fig. 130)

Bombus borealis Kirby, 1837. Fauna Bor. Amer. 4, p. 272.
Bombus borealis Plath, 1922. Psyche 29, pp. 193-194. (biology)
Bremus borealis Brittain and Newton, 1933. Canad. Jour. Res. 9, p. 343. (flower records)
Bombus borealis Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 160 (biology)

QUEEN—Length 18-22 mm., breadth of abdomen 9-9.5 mm.; black, apical tarsal segments becoming somewhat more brownish-piceous, spurs and tegulae black to piceous; wings uniformly but rather lightly infuscated, veins testaceous to black; pubescence rather short but dense, largely pale on head, quite copious above clypeus and around antennae where it is nearly white, with a few dark hairs at each extreme side, pale yellow on vertex and occiput, with a few black hairs laterally, largely fuscous on cheeks, becoming elongate below; pubescence bright yellow on pronotum, tubercles, anterior margin of scutum, entire scutellum, and abdominal terga 1-4, black on propodeum, legs, posterior two-thirds of scutum and terga 5 and 6, that on pleura becoming somewhat more brownish-fuscous anteriorly and below; hind basitarsus and the more apical segments of the other legs with very fine, appressed, pale tomentum which does not quite obscure the surface; corbicular fringe of black, elongate hairs; lateral and upper margins of clypeus quite closely and finely punctate; the broad median area largely shining and impunctate; labrum shining, broadly truncate, with a low basal ridge on each side, broadly concave medially, with scattered, very minute punctures; apical margin of mandible with a pair of low teeth toward the upper angle, otherwise broadly rounded, outer face rather smooth, shining, punctures exceedingly minute, hardly evident; malar space smooth and shining, somewhat longer than basal width of mandibles, punctures exceedingly minute and hardly evident; length of eye about three and a half times that of malar space; punctures of face medially very fine and close, but distinct, becoming somewhat more sparse toward ocelli, space between lateral ocelli and eyes shining and largely impunctate; vertex finely and densely punctate medially, becoming somewhat more distinctly punctate laterally but still close; lateral ocelli slighty nearer eyes than to each other, and slightly nearer each other than to margin of vertex; antennal scape somewhat more than half the total length of flagellum, basal segment of flagellum considerably longer than segment 3 which is slightly longer than 2; posterior margin of hind basitarsus very slightly curved, apex very slightly narrower than median area; tergum 6 narrowly rounded apically, surface obscurely roughened, without distinct punctures.

WORKER—Length 13 mm., breadth of abdomen 6.5 mm.; resembles queen except in size.

MALE—Length 14-17 mm., breadth of abdomen 6.5-7 mm.; black, legs somewhat reddened apically, apical tarsal segments more brownish-piceous; tegulae, and mid and hind spurs, brownish-piceous; wings uniformly but rather lightly infuscated, veins testaceous to piceous; pubescence in general quite long and copious, largely black around antennae and on face below, but with some shorter, greyish, densely plumose hairs beneath; vertex medially and occiput with elongate yellow hairs, erect and black on vertex laterally, and largely blackish or fuscous on cheeks, becoming very long beneath; pubescence yellow on pronotum, tubercles, anterior margin of scutum, entire scutellum and abdominal terga 1-4, largely black on posterior two-thirds of scutum, pleura, propodeum and legs, but pleura with intermixed pale hairs anteriorly and below, and coxae, trochanters and femora with considerable pale pubescence; abdominal terga 5 and 6 black pubescent toward base but with considerable yellow apically, tergum 7 with rather elongate black pubescence; clypeus very finely and rather closely punctate in general, median apical area becoming shining, with very minute, hardly evident punctures; labrum smooth and shining, apical margins slightly incurved over the median area, with a few scattered, irregular punctures medially, lateral areas impunctate and somewhat convex, median line slightly impressed; mandibles quite slender, distinctly bidentate apically, outer surface densely yellowish tomentose, fringed on lower margin with rather elongate, fuscous hairs; malar space smooth and shining, without distinct punctures, much longer than basal width of mandible, and about one-third that of eye; face very finely and closely punctate medially beneath the rather dense pubescence, becoming somewhat more coarse and sparse toward ocelli, space between ocelli and eyes shining and with only scattered, obscure punctures; vertex finely and closely punctate medially, becoming somewhat smoother and more minutely punctate laterally; basal segment of flagellum slightly longer than segment 2, somewhat shorter than 3; hind tibiae somewhat flattened, shining and sparsely punctate on outer surface, the hairs very short and entirely black; apical width of hind basitarsus very slightly less than median width; genital armature as shown (fig. 130).

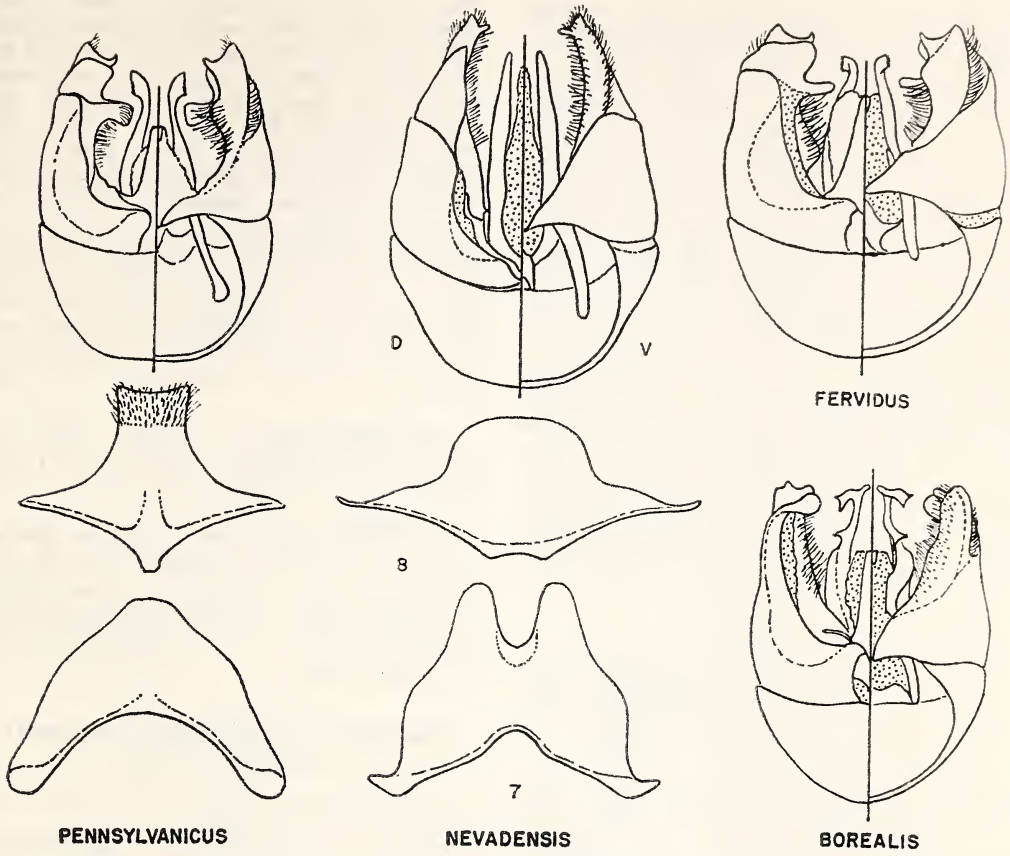


Figure 130—Dorsal (D) and ventral (V) views of genital armature, and sterna 7 and 8 in males of *Bombus*.

DISTRIBUTION—Southern Canada and the adjacent areas of the United States, May to September.

FLOWER RECORDS — Brittain and Newton (1933) record *borealis* on *Pyrus malus*.

Bombus fervidus (Fabricius)

(Fig. 130)

Apis fervida Fabricius, 1798. Sup. Ent. Syst., p. 274.

Bremus fervidus Plath, 1922. Psyche 29, pp. 198-200. (biology)

Bremus fervidus Brittain and Newton, 1933. Canad. Jour. Res. 9, p. 343. (flower records)

Bombus fervidus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 166. (biology)

QUEEN—Length 19-21 mm., breadth of abdomen 9.5 mm.; black, including legs, spurs and tegulae; wings deeply infuscated, veins brownish to piceous; apical margins of abdominal terga narrowly yellowish-hyaline, pubescence copious, rather elongate in general, largely black on head but with a small amount of greyish pubescence intermixed in the black just above antennae; pubescence yellow, long and dense on pronotum, tubercles, pleura above, anterior half of scutum and entire scutellum, black on posterior half of scutum, pleura below and posteriorly, propodeum, and legs in large part; corbicular fringe of elongate black hairs; basitarsus covered with extremely fine pale tomentum which does not quite hide the surface, fringed posteriorly with black hairs, those toward the base more elongate; pubescence yellow on abdominal terga 1-4, black on 5 and 6; clypeus closely and deeply punctate laterally and above, the interspaces in part very minutely punctate, being thus doubly punctate, the median apical area shining and largely impunctate; labrum rather broadly rounded or subtruncate, elevated basally on each side of midline where it is somewhat excavated, with a

median, transverse row of short, fuscous hairs; apex of mandible with a deep notch at upper angle, and a finer notch just below, otherwise broadly rounded, outer face smooth, somewhat shining but minutely roughened; malar space smooth and shining, with scattered, very minute punctures, considerably longer than basal width of mandible, the eye about three and one-half times longer; lateral ocelli very slightly nearer eyes than to each other, and slightly nearer each other than to margin of vertex; median area of face very closely and finely punctate, punctures becoming more deep, distinct and coarse above, surface around ocelli more or less shining and impunctate, vertex finely and densely punctate medially, becoming somewhat more distinctly and finely punctate laterally; antennal scape somewhat more than half length of flagellum, basal segment of flagellum slightly shorter than segments 2 and 3 combined, slightly shorter than 3; posterior margin of hind basitarsus very slightly curved; tergum 6 narrowly rounded apically, rather flat, somewhat shining, minutely punctate.

WORKER—Length 10.5-16 mm., width of abdomen 4-6.5 mm.; similar to queen except for size, but clypeus not so definitely doubly punctate, with a much broader median area that is shining and largely impunctate.

MALE—Length 11-20 mm., breadth of abdomen 5-7 mm.; black, including legs, spurs and tegulae piceous; wings lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga 1-5 narrowly yellowish-hyaline; pubescence copious and elongate, largely black on head, but face and cheeks with some obscure, short, greyish pubescence intermixed at base of the elongate black hairs, and a few yellowish hairs intermixed among the black on vertex; pubescence yellow on pronotum, anterior half of scutum, scutellum, pleura in large part, and propodeum, black on posterior half of scutum, resulting in a conspicuous black interalar band; basal segments of legs with more or less intermixed dark and light pubescence, but largely black on tibiae and tarsi, hind tibiae somewhat dilated apically, with very short, black hairs fringing both anterior and posterior margins; pubescence bright yellow, short and dense on abdominal terga 1-5, largely black on 6 and 7; clypeus closely and rather finely punctate laterally and above, median apical area shining and largely impunctate, punctures of two distinct sizes; labrum rather broadly rounded, narrowly shining and impunctate across base, elsewhere closely and rather finely punctate; mandibles very small and slender, distinctly bidentate at apex, the dorsal tooth somewhat smaller than the other, outer face densely pale tomentose, lower margin fringed with long, curved, fuscous hairs; malar space smooth and shining, with a few scattered, minute punctures, considerably longer than basal width of mandible, eyes slightly less than four times as long; median area of face finely and closely punctate, becoming shining and sparsely punctate above, largely impunctate beneath anterior ocellus and adjacent to lateral ocelli, vertex very densely punctate medially, becoming more distinctly and rather coarsely punctate laterally; basal segment of flagellum distinctly longer than segment 2, 3 nearly twice as long as 2; hind basitarsus very slightly narrowed toward base; genital armature as shown (fig. 130).

DISTRIBUTION — Quebec and New Brunswick to Georgia, west to the Pacific Coast, May to October.

FLOWER RECORDS—*Cirsium, Helianthus* and *Vaccinium*. Brittain and Newton (1933) record *fervidus* on *Amelanchier, Caragana, Daucus, Lonicera, Muscari, Narcissus, Phleum, Pyrus malus, Salix, Taraxacum* and *Tulipa*.

Bombus pennsylvanicus (Degeer)

(Figs. 130 & 131)

Apis pennsylvanica Degeer, 1773. Mem. Serv. Hist. Insects 3, p. 575.

Apis americanorum Fabricius, 1775. Syst. Ent. p. 575.

(?) Apis nidulans Fabricius, 1798. Sup. Ent. Sys., p. 274.

Bombus pallidus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 92. ♀.

Psithyrus cevalliae Cockerell, 1899. Entomologist 32, p. 157. ♂.

Bombus titusi Ashmead, 1902. Ent. News 13, p. 50. ♂.

Bombus pennsylvanicus Rau, 1922. Acad. Sci. St. Louis, Trans. 24, p. 40. (biology)

Bombus americanorum Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Bremus americanorum Frison, 1930. Ent. Soc. Amer. Ann. 23, pp. 644-665. (biology)

(?) Bombus americanorum var. *umbratus* Friese, 1931. Konowia 10, p. 301.

Bombus americanorum Rau, 1934. Acad. Sci. St. Louis, Trans. 28, p. 223. (biology)

Bombus americanorum Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 163. (biology)

Bombus (Fervidobombus) americanorum Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1087. (larva)

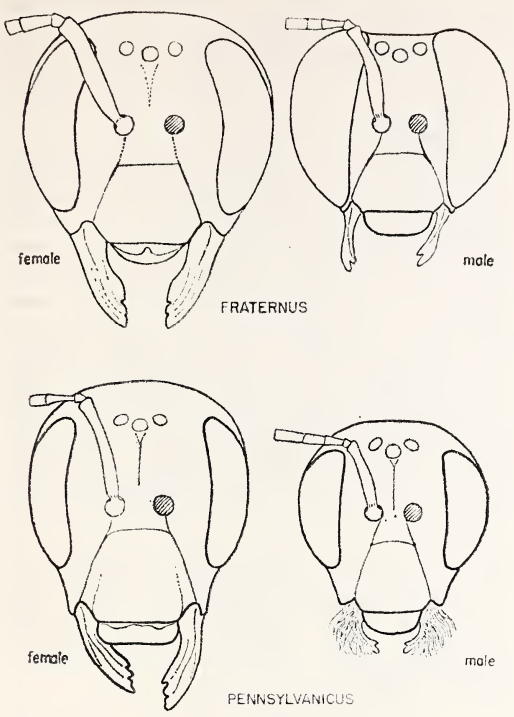


Figure 131
Facial view of head in males and females of *Bombus*.

QUEEN—Length 21-25 mm., breadth of abdomen 9.5-11 mm.; black, including legs, spurs and tegulae; wings deeply infuscated, veins testaceous to blackish; pubescence rather short but copious and dense, bright yellow on pronotum, tubercles, anterior margin of scutum, and abdominal terga 1-3; scutellum with black or intermixed black and yellow pubescence, and basal tergum more or less intermixed with black; otherwise black over entire head, thorax, legs and abdomen; clypeus doubly punctate, rather closely so laterally and above, with quite coarse and rather close punctures, interspaces with very minute punctures, median line and apical margin to some degree impunctate; labrum broadly rounded or subtruncate apically, a basal protuberance on each side, rather deeply excavated medially, with a subapical, transverse row of rather short, fuscous hairs; inner apical angle of mandible with a pair of rather obscure notches, otherwise rather broadly rounded, outer surface somewhat shining, doubly punctate, with coarse, sparse punctures interspersed with very minute and rather close punctures; malar space smooth and shining, with a few minute, scattered punctures, length about equal to basal width of mandible, about one-fourth length of eye; punctures of face fine and close but deep and distinct medially, becoming somewhat coarser and somewhat more distinctly separated just below ocelli, surface between lateral ocelli and eyes shining and impunctate in part, vertex very finely and densely punctate medially, becoming sparsely punctate laterally; lateral ocelli subequally distant from eyes and each other, this considerably less than distance to margin of vertex; scape slightly more than half length of flagellum, basal segment of flagellum considerably shorter than segments 2 and 3 combined; corbicular fringe composed of robust, rather long black hairs, the hind basitarsi very slightly broader at basal third than at apex; tergum 6 narrowly rounded apically, somewhat shining, minutely and rather sparsely punctate toward apex, the broad basal area dull, densely and finely roughened.

WORKER—Length 14-18 mm., breadth of abdomen 6.5-8 mm.; resembles the queen in most details other than size, but thoracic pubescence tends to be more elongate and copious.

MALE—Length 16-22 mm., breadth of abdomen 6.5-8 mm.; black, including legs, spurs and tegulae; wings quite deeply infuscated, veins testaceous to piceous; apical margins of abdominal terga narrowly yellowish-hyaline; pubescence in general quite long and copious, face and cheeks with short, greyish-white pubescence, interspersed with long and erect, black hairs, vertex largely black; pubescence yellow and elongate on pronotum, tubercles, anterior margin of scutum, and pleura adjacent to tubercles, black on posterior two-thirds of scutum, the scutellum, pleura and propodeum with long intermixed black and pale hairs; pubescence largely blackish or dark on legs anteriorly, the posterior fringes more or less pale, fringes on hind tibiae very short and distinctly black on anterior margin, yellowish on the posterior margin; abdominal terga 1-4 densely clothed with elongate and erect, yellow pubescence, 6 and 7 more or less black pubescent on the discs, fringed laterally and on 7 apically with yellowish hairs; tergum 5 is yellow in some specimens, black in others; clypeus closely, finely, deeply and distinctly punctate laterally and above, median apical area shining and impunctate; labrum shining and impunctate across basal margin, otherwise with close, irregular, rather minute punctures, apical margin rather broadly subtruncate, lateral margins rounded; mandibles short and slender, distinctly bidentate apically, the lower tooth more robust than the upper, outer face densely clothed with short, yellowish tomentum, completely hiding the surface, lower margin fringed with elongate, fuscous hairs; malar space smooth and shining, with very

minute, scattered punctures, length about equal to basal width of mandible, about one-fourth length of eye; median area of face rather finely and densely punctate, these becoming relatively coarse and well separated toward ocelli, surface between ocelli and eyes shining and sparsely punctate, vertex very closely but rather coarsely punctate medially, becoming somewhat more finely and more sparsely punctate laterally; lateral ocelli very slightly nearer each other than to eyes, subequally distant from eyes and margin of vertex; segments 1 and 2 of flagellum equal, segment 3 only slightly shorter than 1 and 2 combined; sterna 7 and 8 and genital armature as shown (fig. 130).

DISTRIBUTION—Quebec to Florida in the East, west to Pacific Coast, throughout season.

FLOWER RECORDS — *Aureolaria, Bidens, Cirsium, Cucurbita, Daucus, Eupatorium, Galactia, Hydrolea, Hypericum, Kuhnistera, Liatris, Malus, Medicago, Opuntia, Pontederia, Rhus, Richardia, Rubus, Spiraea, Vernonia* and *Vicia.* Robertson (1929) records this species on the following: *Abutilon, Actinomeria, Aesculus, Agastache, Amelanchier, Amorpha, Antennaria, Arctium, Asclepias, Aster, Astragalus, Baptisia, Blephilia, Boltonia, Brauneria, Campanula, Cassia, Cephalanthus, Cerastium, Cercis, Circaea, Claytonia, Clematis, Collinsia, Convolvulus, Coreopsis, Cornus, Crataegus, Crotalaria, Cuphea, Delphinium, Desmodium, Dentaria, Dianthera, Dicentra, Diospyros, Dipsacus, Dodecatheon, Eryngium, Frasera, Gaura, Gentiana, Geranium, Gerardia, Gymnocladus, Helenium, Helianthus, Heliopsis, Heuchera, Hibiscus, Hydrangea, Hydrophyllum, Impatiens, Ipomoea, Iris, Isopyrum, Krigia, Lantana, Leonurus, Lepedeza, Linaria, Lippia, Lithospermum, Lobelia, Lonicera, Ludwigia, Lycopus, Marrubium, Martinia, Melilotus, Mertensia, Mimulus, Monarda, Nelumbo, Nepeta, Oenothera, Orobanche, Oxalis, Pastinaca, Pelatostemum, Pentstemon, Philadelphus, Phlox, Physostegia, Plantago, Podophyllum, Polemonium, Polygonatum, Polygonum, Polytaenia, Potentilla, Prenathes, Prunella, Prunus, Psoralea, Pycnanthemum, Pyrus, Ranunculus, Rhamnus, Ribes, Robinia, Rosa, Rudbeckia, Ruellia, Sagittaria, Salix, Scutellaria, Seymeria, Sida, Silene, Silphium, Sium, Solanum, Solidago, Specularia, Stachys, Staphylea, Strophostyles, Stylosanthes, Symphoricarpus, Tecoma, Teucrium, Tilia, Tradescantia, Triosteum, Trifolium, Uvularia, Verbascum, Verbesina, Verbina, Vernonia, Veronica, Viburnum, Viola, Vitus* and *Zizia.*

The male of *pennsylvanicus* can be easily confused with that of *fervidus* (Fabricius). In the latter, however, the malar space is slightly longer than basal width of mandible, and the eyes only about three and one half times length of malar space: the short greyish pubescence on face and cheeks is much less evident, giving the head a much more definitely black appearance; segment 2 of the flagellum is distinctly shorter than the 1st, and the two combined are distinctly longer than segment 3; the scutellum, pleura and propodeum are definitely yellow pubescent, with no black hairs evident except on posterior surface of propodeum, just below the dorsal triangle; the wings are somewhat less deeply infuscated; the hind tibiae are somewhat more broadly dilated apically, with both the posterior and anterior fringes black.

Bombus fraternus (Smith)

(Figs. 131 & 132)

Apathus fraternus Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 385. ♂.

Bombus scutellaris Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 96. ♀ ♂ ☿.

Bombus scutellaris Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

QUEEN—Length 21-27 mm., breadth of abdomen 9-13 mm.; black, legs somewhat reddish-piceous, apical tarsal segments somewhat more brownish-piceous, the corbicular surface dark ferruginous; tegulae blackish; wings quite deeply infuscated basally, becoming slightly paler apically, veins testaceous to black; pubescence in general short but quite dense, entirely back on head; pubescenc yellow on pronotum, anterior half of scutum, scutellum and in large part on pleura, the apical half of scutum black, forming a distinct interalar band; propodeum piceous laterally, nearly bare posteriorly, the venter and narrow anterior surface of pleura black; legs in general black pubescent, hairs quite short, without conspicuous posterior fringes, the corbicular fringe quite dense but of relatively short hairs; pubescence yellow, dense and short on abdominal terga 1 and 2, black on 3-6, in sharp contrast; upper half of clypeus quite finely, closely and deeply punctate,

the apical two-thirds shining, with minute, irregular and rather sparse punctures; labrum rather broadly rounded, with a basal, elevated ridge which is slightly interrupted medially, this area abruptly depressed to the margin; apex of mandible slightly notched toward upper angle, outer face somewhat shining, with minute, irregular and vague punctures; malar space shining and impunctate, very short, its median length only about half basal width of mandibles; eyes elongate, very slightly convergent above; ocelli much below supraorbital line, lateral ocelli subequally distant from eyes and each other, much more widely removed from margin of vertex; antennal scape two-thirds length of flagellum, basal segment of flagellum slightly shorter than segments 2 and 3 combined; posterior margin of hind basitarsus slightly incurved toward the base; tergum 6 narrowly rounded apically, largely bare, slightly impressed on each side.

WORKER—Length 13-18 mm., breadth of abdomen 6.5-9 mm.; with no evident structural or color differences from the queen.

MALE—Length 19-25 mm., breadth of abdomen 8-10 mm.; black, legs somewhat reddened apically, spurs reddish-piceous, tegulae blackish to piceous; wings quite deeply infuscated basally, becoming slightly paler apically, veins piceous to black; pubescence in general quite short but dense and copious, that on head entirely black, although somewhat hoary on lower part of face and cheeks; pubescence yellow on pronotum, scutellum and in large part on pleura and scutum, the latter with a small median area of short fuscous hairs posteriorly; pubescence fuscous on propodeum and on pleura beneath and anteriorly; legs largely black pubescent, apex of tibiae with some very dense, short, yellowish tomentum; abdominal terga 1 and 2 entirely and densely, short, yellow pubescent, 3-7 entirely black, the more apical terga with elongate and erect hairs; clypeus very finely and closely punctate except along apical margin; labrum somewhat more shining, irregularly and minutely punctate, slightly depressed medially, margin broadly rounded or subtruncate; mandibles very small and slender, slightly constricted medially, bidentate apically, the lower tooth much larger than the acute upper tooth; malar space linear, hardly evident, eyes nearly reaching base of mandible, strongly convergent above; lateral ocelli nearly contiguous with inner margin of eye, only slightly nearer margin of vertex than to antennae; flagellum long and slender, total length more than twice length of scape, basal segments 1 and 3 subequal in length, segment 2 considerably shorter; sterna 7 and 8 and genital armature as shown (fig. 132).

DISTRIBUTION—Michigan to Florida, March to November.

FLOWER RECORDS — *Bidens, Eryngium, Gaillardia, Hypericum, Kuhnistera, Lespedeza, Monarda, Padus, Rhus* and *Vaccinium.* Robertson (1929) gives the following additional records: *Acerates, Aesculus, Asclepias, Aster, Boltonia, Brauneria, Cassia, Cephalanthus, Cirsum, Collinsia, Eupaterium, Gerardia, Helenium, Helianthus, Krigia, Lithospermum, Lepachys, Melilotus, Nelumbo, Petalostemum, Psoralea, Pycnanthemum, Robinia, Rudbeckia, Silphium, Solanum, Solidago, Teucrium, Trifolium, Verbena* and *Zizia.*

Bombus griseocollis (Degeer)

(Figs. 129 & 132)

Apis griseocollis Degeer, 1773. Mem. Serv. Hist. Insectes 3, p. 576.

(?) Apis virginica Olivier, 1789. Encycl. Meth. 4, p. 66.

(?) Apis virginica Fabricius, 1793. Ent. System. 2, p. 318.

(?) Bombus virginicus Fabricius, 1804. Syst. Piez. p. 346.

Bombus separatus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 165. ♀ ♂ ☿

Bombus separatus Plath, 1927. Psyche 34, pp. 125-127. (biology)

Bombus separatus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Bremus separatus var. *nero* Bequaert and Plath, 1925. Mus. Compar. Zool. Bul. 67, p. 275. ♀

Bombus separatus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 155. (biology)

QUEEN—Length 21-23 mm., breadth of abdomen 9.5-11 mm.; black, including legs, spurs and tegulae; wings quite uniformly, deeply infuscated, veins brownish to piceous; pubescence in general quite short but dense, black on head, yellow on scutum, scutellum, pronotum, and on pleura to bases of legs, scutum with a median, narrow, bare area which is fringed with a few short black hairs; pubescence black on venter of thorax and legs, very short on legs, but front and mid femora with posterior fringes of somewhat more elongate hairs, the corbicular fringe entirely black laterally and along the narrow apical margin, and terga 3-6 entirely black, hairs quite short but dense and suberect; clypeus closely and finely punctate laterally and above, the broad

median area smooth and somewhat shining; labrum rather broadly rounded or subtruncate apically, with a pair of basal ridges separated medially by a rather broadly rounded concavity which is slightly elevated above the margin on each side, with an apical fringe of very short yellowish hairs; apex of mandible with a pair of slight notches near the upper angle, outer face toward base somewhat shining, with extremely minute, rather close punctures; malar space smooth and shining, without distinct punctures, somewhat shorter than basal width of mandible, about one-fifth length of eye; punctures of face fine and very close, becoming somewhat more distinct and more widely separated below ocelli, surface between lateral ocelli and eyes smooth and nearly impunctate; vertex finely and very densely punctate medially, punctures becoming somewhat more distinct but still close laterally; lateral ocelli slightly nearer eyes than to each other, distinctly below supraorbital line, slightly nearer each other than to margin of vertex; antennal scape somewhat more than half total length of flagellum, basal segment of flagellum only slightly shorter than segments 2 and 3 combined, 3 slightly longer than 2; posterior margin of hind basitarsus very slightly curved, median width slightly less than half the length; tergum 6 shining, very minutely punctate, narrowly rounded apically.

WORKER—Length 9.5-18 mm., breadth of abdomen 5-8.5 mm.; resembles queen except for the usual smaller size.

MALE—Length 15-19 mm., breadth of abdomen 6-7 mm.; black, legs and tegulae somewhat more reddish-piceous, spurs brownish-testaceous; wings rather lightly but uniformly infuscated, veins testaceous to piceous; apical margins of the abdominal terga very narrowly yellowish-hyaline; pubescence in general rather short and dense, largely pale yellowish on face above and below antennae and on clypeus, with scattered, erect, black hairs intermixed; vertex and occiput with intermixed yellowish and black hairs medially, cheeks with more fuscous hairs above, becoming yellowish below; scutum with a small median fuscous pubescent area posteriorly, and pleura with a few fuscous hairs above mid coxae, otherwise entire thorax densely yellow pubescent; all femora fringed beneath with elongate yellowish hairs, these becoming more fuscous on upper surface; tibiae largely blackish or fuscous pubescent, with posterior fringes of elongate hairs; and basitarsi with some elongate, dark hairs posteriorly, clothed beneath with short brownish hairs; basal abdominal tergum, and basal margin of tergum 2 medially, with erect, yellowish pubescence, remainder of terga 2 and all of 3-7 black pubescent, hairs very short, dense and suberect; clypeus finely and quite closely punctate beneath dense pubescence, but with a median, apical, shining, impunctate area; labrum broadly truncate, somewhat shining, especially on each side basally, with obscure, irregular and rather shallow, fine punctures; mandibles slender, bidentate apically, outer surface densely short pubescent, this yellow in part but fringed along lower margin with elongate fuscous hairs; malar space smooth and shining, with very minute, barely visible punctures, its median length about half basal width of mandible, only about one-tenth length of eye; face very narrow, eyes very slightly convergent above, lateral ocelli separated from eyes by less than half their diameter, and much below supraorbital line, nearer to each other than to margin of vertex; facial punctures very fine and close beneath dense pubescence, becoming rather sparse on shining surface below ocelli, punctures of vertex medially quite deep and distinct but close, becoming somewhat finer laterally; basal segment of flagellum subequal to segment 3, segment 2 considerably shorter; hind tibiae shining, somewhat convex, very sparsely punctate, basitarsi elongate and parallel-sided; sterna 7 and 8 and genital armature as shown (fig. 132).

DISTRIBUTION—Quebec and Maine to Florida, and throughout the West. February to August.

FLOWER REORDS—*Apocynum, Aronia, Asclepias, Ceanothus, Chamaecrista, Cirsium, Eryngium, Helenium, Helianthus, Hypericum, Ilex, Itea, Malus, Pontederia, Rhus, Rubus, Silphium, Solidago, Vaccinium* and *Vicia*. Robertson (1929) gives the following additional records: *Abutilon, Acerates, Actinomeris, Aesculus, Agastache, Amorpha, Arabis, Asclepias, Aster, Astragalus, Baptisia, Bidens, Blephilia, Brauneria, Camassia, Campanula, Cassia, Caulophyllum, Ceanothus, Cephalanthus, Cercis, Cirsium, Collinsia, Cornus, Crataegus, Delphinium, Dentaria, Desmodium, Dianthera, Dicentra, Diospyros, Dodecatheon, Erigeron, Eryngium, Eupatorium, Frasera, Gerardia, Geranium, Gleditzia, Helenium, Helianthus, Hibiscus, Houstonia, Hydrangea, Hypericum, Hydrophyllum, Ipomoea, Iris, Krigia, Liatris, Lobelia, Lythrum, Marubium, Melilotus, Mertensia, Monarda, Nelumbo, Nepita, Pastinaca, Pentstemon, Petalostemon, Phlox, Podophyllum, Polemonium, Prunella, Prunus, Psoralea, Pycnanthemum, Pyrus, Rhus,*

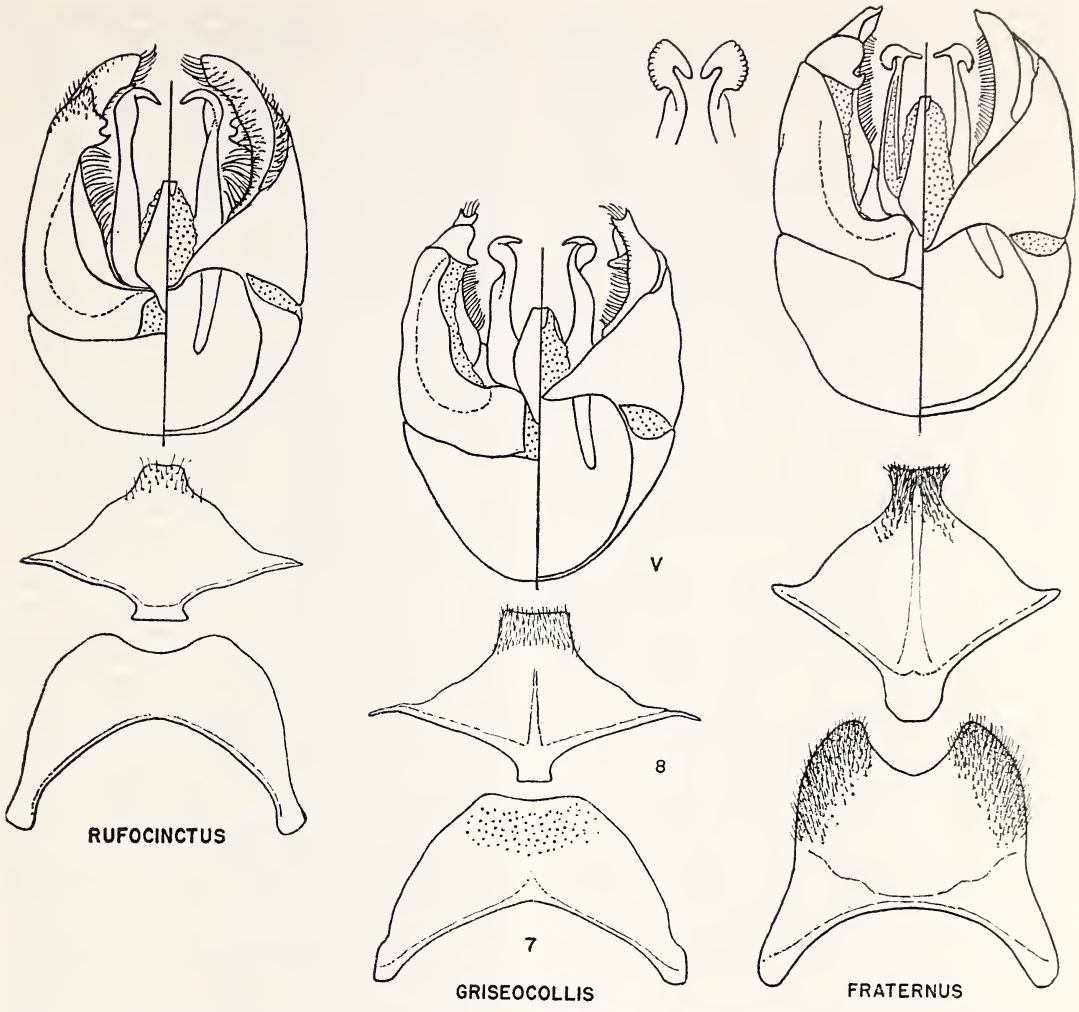


Figure 132—Dorsal and ventral views of genital armature, and sterna 7 and 8 in males of *Bombus*. A more detailed view of tips of penis valves in *B. fraternus* is shown.

Ribes, Robinia, Rosa, Rubus, Rudbeckia, Salix, Scutellaria, Silphium, Sisyrinchium, Solidago, Specularia, Symphoricarpus, Taenidia, Teucrium, Tradescantia, Trifolium, Verbena, Vernonia, Viburnum, Viola, Vitis, Uvularia and *Zizia.*

Bombus rufocinctus Cresson
(Fig. 132)

Bombus rufocinctus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 106. ♂ ☿

Bombus rufocinctus var. *astragali* Cockerell, 1907. Entomolgist 40, p. 97. ♀.

Bombus rufocinctus var. *castoris* Cockerell, 1915. Ann. Mag. Nat. Hist. (8) 15, p. 537. ♂.

Bombus rufocinctus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 158. (biology)

QUEEN—Length 16-18 mm., breadth of abdomen 8.5 mm.; black, including legs, spurs and tegulae; wings rather deeply infuscated, veins brownish to piceous; pubescence copious but rather short, largely black on face and cheeks, but with some intermixed, shorter light hairs above antennae, cheeks with some greyish hairs intermixed with the black; vertex with a tuft of pale yellowish hairs medially, becoming black on each side, occiput with a dense, pale yellowish fringe; pubescence bright yellow on pronotum, tubercles, anterior third of scutum, entire scutellum, pleura and propodeum in large part, the scu-

tum bare medially, with black pubescence over posterior two-thirds, the thoracic venter narrowly fuscous pubescent beneath, and legs clothed with largely black hairs, with some paler hairs on the inferior fringe of hind femora, the corbicular fringe of elongate, largely black hairs, basitarsi clothed beneath with brownish pubescence, upper surface nearly bare but with very minute, pale pruinose hairs that do not hide surface; abdominal terga 1 and 4 with bright yellow pubescence, 2 with yellow pubescence medially and across the base, but with elongate fulvous hairs apically and laterally, 3 with largely fulvous hairs which overlie tergum 4 which is largely yellow pubescent; terga 5 and 6 black pubescent but with dense yellow fringes on each side of 5; clypeus very finely and rather closely punctate laterally and above, a broad median area shining and nearly impunctate, with only very minute or widely scattered punctures; labrum slightly elevated at base, this broadly interrupted medially by a quite deep impression, its apical margin rounded and slightly elevated above the apical margin on each side, and fringed apically with ochraceous hairs; apex of mandible with a pair of distinct notches toward the upper angle, otherwise entire, outer face rather smooth, with barely evident, minute punctures; malar space smooth and shining, without evident punctures, its length hardly more than half the basal width of mandible, hardly more than one-eighth the length of the eye; median area of face with rather deep and distinct but quite close punctures, intervening spaces with more minute and shallow punctures, surface shining and impunctate around ocelli; the vertex densely punctate medially beneath the pubescent tuft, becoming somewhat more distinctly but very closely punctate laterally; lateral ocelli somewhat nearer eyes than to each other and nearer each other than to margin of vertex; antennal scape considerably more than half the total length of flagellum, basal segment of flagellum only slightly shorter than segments 2 and 3 combined, these nearly equal in length; hind basitarsi quite broad, the length only about twice the greatest breadth; tergum 6 shining and minutely punctate, punctures becoming somewhat closer toward margins, narrowly rounded at apex.

WORKER—Length 11-12.5 mm., breadth of abdomen 5-5.5 mm.; quite similar to queen but pubescence relatively more elongate, with considerable variation in the pattern of pubescence on abdominal terga, with some black pubescence evident on the more median terga in some specimens.

MALE—Length 12-13 mm., breadth of abdomen 5.5-6 mm.; black, apical segments of legs and tegulae somewhat more piceous, mid and hind spurs reddish-piceous; wings rather lightly infuscated, veins testaceous to piceous; apical margins of abdominal terga narrowly testaceous-hyaline; pubescence copious and erect, largely yellow on cheeks below, on clypeus and on vertex medially, black around and above antennae and along margins of eyes, on cheeks above and vertex laterally, with a few black hairs overlying ocelli; pubescence bright yellow on pronotum, anterior third of scutum, around tubercles, over most of pleura, and on scutellum and propodeum; posterior two-thirds of scutum with conspicuous black pubescence, basal segments of legs, including femora, more or less yellow pubescent, the lower margin of femora rather densely fringed with yellowish hairs, tibiae more black pubescent, with rather conspicuous posterior fringes, hind tibiae very narrowly fringed with black anteriorly, and with more elongate, black hairs posteriorly; basitarsi with pale brownish pubescence beneath, with somewhat darker pubescence above on front and middle legs, hind pair with a rather conspicuous fringe of elongate dark hairs posteriorly; abdominal terga 1, 2, 5 and 6 with conspicuous yellow pubescence, 3, 4 and 7 largely black; clypeus very finely and rather closely punctate beneath the dense pubescence, but median apical area becoming shining and largely impunctate; labrum broadly truncate, shining and impunctate in large part, with only a few scattered, irregular punctures; mandibles slender apically, bi-dentate, outer face very densely tomentose, hiding surface, and fringed beneath with long curled hairs; malar space smooth and shining, impunctate, very short, no more than half basal width of mandibles, and about one-tenth length of eye; median area of face finely and closely but not densely punctate, punctures becoming more distinct and sparse toward ocelli, space between ocelli and eyes smooth and impunctate; punctures very close and fine but not crowded on vertex medially, becoming somewhat more minute and irregular laterally; ocelli slightly below supraorbital line, considerably nearer each other than to margin of vertex, and much nearer eyes than to each other; antennal scape much less than half total length of flagellum, basal segment of flagellum about equal to segment 3, segment 2 considerably shorter, not much longer than broad; hind tibiae strongly convex but rather narrow, shining and largely impunctate on outer surface, hind basitarsus broad, length not much greater than twice the maximum breadth; sterna 7 and 8 and genital armature as shown (fig. 132).

DISTRIBUTION—Pacific Coast to Michigan, Quebec and Maine, July to October.

Bombus bimaculatus Cresson

Bombus bimaculatus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 92. ♂.
Bombus bimaculatus Plath, 1922. Psyche 29, pp. 194-195. (biology)
Bombus bimaculatus Frison, 1928. Ent. Amer. (n.s.) 8, pp, 159-223. (biology)
Bombus ridingsi Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Bombus bimaculatus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 141. (biology)

QUEEN—Length 17-22 mm., breadth of abdomen 8.5-10 mm.; black, apical tarsal segments becoming more piceous, spurs reddish-piceous, tegulae black; wings lightly infuscated, veins brownish to piceous; pubescence copious and dense but rather short, largely black on head but with some conspicuous yellow pubescence on vertex medially just posterior to a dense fringe of black hairs; thorax largely yellow pubescent, with only a rather small, median posterior area of black hairs and some dark hairs on lateral faces of propodeum below; pubescence of legs largely black or fuscous, with a few pale hairs in posterior fringes of femora, corbicular fringe composed of elongate, black hairs; basal abdominal tergum yellow pubescent and tergum 2 with a small amount of yellow toward base across the median third, abdomen otherwise densely black pubescent; clypeus smooth and shining, with rather close, fine, irregular punctures along the narrow lateral and upper margins, the broad, median, apical area nearly impunctate; labrum quite broadly truncate, with a basal ridge which is interrupted medially, apical margin fringed with golden hairs, slightly rounded medially and on each side, with a low emargination separating them; apex of mandible with a pair of low, obscure notches toward upper angle, lower angle very slightly emarginate, outer face rather smooth, only obscurely punctate; malar space smooth and shining, median length about equal to basal width of mandible, about one fourth length of eye; median area of face very finely and closely punctate, punctures becoming somewhat more distinct and separate toward ocelli, surface largely smooth and impunctate between ocelli and eyes; punctures minute and densely crowded on vertex medially, very fine and close even laterally; antennal scape slightly more than half total length of flagellum, basal segment of flagellum only slightly shorter than segments 2 and 3 combined, 3 somewhat longer than 2; posterior margin of hind basitarsus nearly parallel with anterior margin; tergum 6 narrowly rounded apically, with a low, obscure, median ridge apically, surface shining and minutely punctate.

WORKER—Length 11-16 mm., breadth of abdomen 5-6.5 mm.; very similar to queen except in size.

MALE—Length 13-14.5 mm., breadth of abdomen 6-6.5 mm.; black, apical tarsal segments somewhat more piceous, mid and hind spurs reddish; tegulae becoming obscurely yellowish-hyaline along outer margin; wings lightly infuscated, veins testaceous to piceous; pubescence long, copious and dense, black and erect below and above antennae and just above ocelli, but vertex with dense yellow pubescence along posterior margin; cheeks below with elongate yellowish pubescence, this becoming darker toward vertex; clypeus with considerable short, yellowish pubescence, with scattered, elongate black hairs; thorax largely yellow pubescent, with only a very small, median, posterior area of obscure dark pubescence; legs with considerable pale pubescence basally but with largely fuscous fringes on tibiae, outer surface of basitarsi more or less pale pubescent, the lower surface reddish-brown; basal abdominal tergum and median basal area of tergum 2 with yellow pubescence, the following segments with varying amounts of black and yellow, sometimes entirely black, sometimes largely yellow on 4 or 5 and tergum 2 in some specimens entirely yellow; clypeus very finely and rather closely punctate but shining beneath quite dense pubescence; labrum shining, truncate apically with only a few obscure, minute punctures medially toward base, apical half more closely but minutely punctate; mandibles very small and slender, bidentate apically, outer surface densely ochraceous tomentose, apical margin with a fringe of elongate, testaceous hairs; malar space smooth and shining, only very minutely and obscurely punctate, its median length somewhat greater than basal width of mandible, about one-fourth length of eye; face very finely and closely punctate medially beneath quite dense pubescence, becoming more coarsely and sparsely punctate toward ocelli, space between lateral ocelli and eyes shining and largely impunctate; vertex very densely and rather finely punctate medially, becoming more minute and obscure but still quite close laterally; basal segment of flagellum slightly longer than segment 2, slightly shorter than 3; lower surface of hind tibiae somewhat convex, shining and sparsely punctate, posterior fringe of elongate hairs, the basitarsus nearly parallel-sided; terga 7 and 8 and genital armature as in *impatiens* (fig. 133).

DISTRIBUTION — Ontario to Maine, south to Mississippi and Florida, March to September, February in Florida.

FLOWER RECORDS — *Batodendron, Cirsium, Halesia, Hydrangea, Hypericum, Ilex, Itea, Kalmia, Malus, Melilotus, Pentstemon, Prunus, Rhododendron, Rosa, Rubus, Solidago, Stachys, Vaccinium* and *Vicia*. Robertson (1929) records *bimaculatus* also on *Amelanchier, Blephilia, Collinsia, Caulophyllum, Cephalanthus, Dentaria, Dicentra, Geranium, Helianthus, Hydrophyllum, Mertensia, Monarda, Nepeta, Phlox, Polemonium, Ribes, Seymeria, Triosteum, Trifolum, Uvularia* and *Verbena*.

Bombus impatiens Cresson
(Fig. 133)

Bombus impatiens Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 90. ♂.
Bombus impatiens Plath, 1922. Psyche 29, pp. 195-197. (biology)
Bombus impatiens Frison, 1929. Brooklyn Ent. Soc. Bul. 24, pp. 261-282.
Bombus impatiens Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)
Bombus impatiens Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 144. (biology)
Bombus impatiens var. *deayi* Chandler, 1956. Ind. Acad. Sci. Proc. 65, p. 116. ♀.

QUEEN—Length 17-21 mm., breadth of abdomen 8.5-11 mm.; black, including legs and tegulae, spurs reddish-piceous; wings lightly infuscated, veins brownish to piceous; pubescence bright yellow, copious but rather short on pronotum, scutum, scutellum, mesopleura in large part, and basal abdominal tergum, a few black hairs on scutum medially and some yellowish pubescence on propodeum laterally, becoming black below; a small amount of yellowish pubescence intermixed with black on vertex and occiput medially, otherwise entirely black on head, venter of thorax, legs and abdominal terga 2-6; corbicular fringe quite dense and elongate, entirely black; clypeus quite closely and finely punctate laterally and above, the broad median area shining, minutely and obscurely punctate; labrum rather broadly truncate, with a basal elevation on each side, shallowly excavated or concave between, apical margin of this area rather broadly rounded, somewhat elevated above the margin on each side; apex of mandible with a pair of short but quite distinct teeth on the upper angle, otherwise broadly rounded, outer face shining, only very minutely and obscurely punctate; malar space smooth and shining, practically impunctate, considerably shorter than basal width of mandible, about one-fifth length of eye; punctures of medial area of face very fine and close, becoming somewhat more sparse and distinct toward ocelli, space between lateral ocelli and eyes shining and impunctate, vertex very finely and densely punctate medially beneath dense pubescence, becoming somewhat more distinctly but still closely punctate laterally; lateral ocelli slightly nearer eyes than to each other, and somewhat nearer each other than to margin of vertex; antennal scape slightly more than half the total length of flagellum; basal segment of flagellum very slightly longer than segment 3, and 3 slightly longer than 2; posterior margin of hind basitarsi slightly and regularly curved; apex of tergum 6 very narrowly rounded, the surface smooth, shining and only very minutely and quite sparsely punctate.

WORKER—Length 8.5-16 mm., breadth of abdomen 4-7 mm.; very similar to queen in color, pubescence and structure, usually with fewer yellowish hairs on vertex, pubescence somewhat more elongate and copious, wings somewhat paler.

MALE—Length 12-17 mm., breadth of abdomen 5-6.5 mm.; black, including legs, the spurs somewhat more piceous and tegulae brownish-piceous; wings subhyaline, veins testaceous to piceous; apical margins of the terga very narrowly testaceous-hyaline; pubescence long and copious, yellowish on vertex, occiput, cheeks posteriorly and below, and on median area of face and clypeus, with erect black hairs on cheeks above, vertex laterally, face between ocelli and antennae, and with intermixed, long, black hairs on face below antennae; pronotum, scutum, scutellum and pleura in large part yellow pubescent, a few intermixed blackish hairs on median posterior area of scutum, and propodeum largely yellow; legs with yellowish pubescence at base but becoming black on femora apically and on tibiae and basitarsi; basal abdominal tergum yellow pubescent, following terga entirely black pubescent; clypeus shining, finely and quite closely but regularly punctate beneath dense pubescence; labrum quite smooth, shining, truncate apically, lateral margin rounded, very minutely and rather sparsely punctate; mandibles slender, bidentate apically, outer surface densely yellow pubescent, completely hiding the surface, fringed below with long, curled, yellowish hairs; malar space smooth and shining, not distinctly punctate, length about equal to basal width of mandible; median area of face very finely and closely punctate, the punctures becoming somewhat more coarse and distinct but still close toward ocelli, area between lateral ocelli and eyes polished and impunctate, vertex finely

and densely punctate medially beneath dense pubescence, punctures becoming somewhat more distinct but still close laterally; lateral ocelli somewhat nearer eyes than to each other, and slightly nearer each other than to margin of vertex; segments 1 and 2 of flagellum about equal in length, segment 3 somewhat longer; hind tibiae quite slender, outer surface shining and very sparsely punctate, especially apically, only slightly convex, the fringe of rather elongate, black hairs; hind basitarsi quite slender and elongate, about three times longer than the maximum width; sterna 7 and 8 and genital armature as shown (fig. 133).

DISTRIBUTION — Ontario to Maine, south to Florida, March to November, January and February in Florida.

FLOWER RECORDS — *Abelia, Apocynum, Bidens, Cirsium, Erigeron, Eupatorium, Gelsemium, Ilex, Malus, Polygonum, Pontederia, Solidago, Trilisa* and *Vaccinium.* Robertson (1929) lists the following genera: *Actinomeris, Aesculus, Agastache, Amphicarpa, Arabis, Arctium, Asclepias, Aster, Blephilia, Boltonia, Brauneria, Camassia, Campanula, Cassia, Caulophyllum, Cephalanthus, Cercis, Cicuta, Claytonia, Clematis, Collinsia, Coreopsis, Crataegus, Cucurbita, Delphinium, Dentaria, Desmodium, Dianthera, Dicentra, Diosypros, Dodecatheon, Eryngium, Erythronium, Frageria, Gaura, Geranium, Gerardia, Gymnocladus, Helenium, Helianthus, Heliopsis, Hydrophyllum, Impatiens, Lactuca, Liatris, Linaria, Lithospermum, Lobelia, Lonicera, Lycopus, Lythrum, Malva, Monarda, Nelumbo, Nepeta, Osmorrhiza, Pastinaca, Pentstemon, Petalostemum, Phlox, Podophyllum, Polemonium, Prenanthes, Prunella, Prunus, Psoralea, Pycnanthemum, Pyrus, Ribes, Robinia, Rosa, Rubus, Rudbeckia, Salix, Scrophularia, Scutellaria, Seymeria, Sicyos, Silphium, Sium, Smilax, Solanum, Stachys, Staphylea, Symphoricarpos, Taraxacum, Teucrium, Tradescantia, Trifolium, Uvalaria, Verbena, Viola, Vitis,* and *Zizia.*

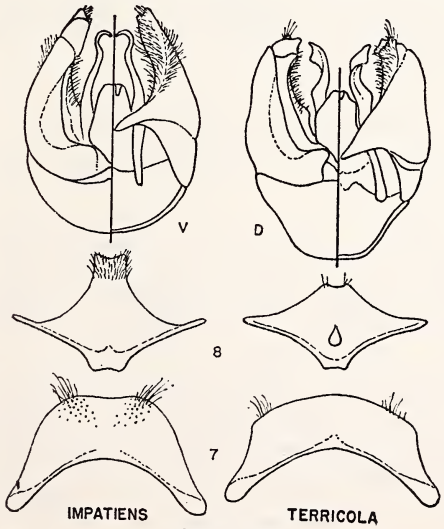


Figure 133
Dorsal (D) and ventral (V) views of genital armature, and sterna 7 and 8 in males of *Bombus*.

Bombus perplexus Cresson

Bombus perplexus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 91. ♂.

Bombus hudsonicus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 92. ♂.

Apathus dorsalis Provancher, 1888. Addit. Corr. Faune Ent. Canada, Hym. p. 343. ♂ (not ♀). New synonymy.

Bombus perplexus Plath, 1927. Psyche 34, pp. 124-125. (biology)

Bombus perplexus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 146. (biology)

QUEEN—Length 17-21 mm., breadth of abdomen 8.5-9 mm.; black, apical tarsal segments somewhat more piceous, mid and hind spurs and tegulae piceous; wings rather lightly infuscated, veins pale testaceous to piceous; pubescence copious and quite elongate, largely black on head, with a small amount of pale pubescence on occiput and vertex medially; pubescence yellow on pronotum, tubercles, scutum in large part, scutellum, upper portion of pleura and abdominal terga 1 and 2, the median posterior area of scutum relatively bare, sometimes with a few marginal or intermixed black hairs; pubescence of legs and of abdominal terga 3-6 black, or tergum 6 with a few pale hairs laterally; pleura either black, or yellow at bases of legs; corbicular fringe of elongate black hairs; basitarsi with brownish pubescence beneath, dark on outer surface, the hind basitarsus and following segments with very fine and rather obscure pale pruinose hairs; clypeus very finely and closely punctate laterally and above, becoming quite sparsely and very finely punctate over the broad median area, surface shining; labrum with a basal ridge which is slightly interrupted medially, this area somewhat excavated but slightly elevated above the margin on each side, this fringed with short, ochraceous hairs; apex of mandible with a pair of low notches toward upper

angle, very shallowly but broadly emarginate toward lower angle, outer face smooth, without distinct punctures; malar space smooth and shining, not noticeably punctate, its length very slightly shorter than basal width of mandible and slightly less than one-third length of eye; face medially very minutely and densely punctate, punctures becoming somewhat more distinct, well separated, but still very fine toward ocelli, space between ocelli and eyes polished and only very sparsely and minutely punctate; vertex minutely and densely punctate medially, the punctures becoming somewhat more distinct but still very close laterally; lateral ocelli slightly nearer eyes than to margin of vertex, subequally distant from eyes and each other; antennal scape very slightly more than half total length of flagellum, basal segment of flagellum considerably longer than segment 3, the latter very slightly longer than 2 which is considerably longer than broad; maximum width of hind basitarsus only very slightly less than half the length, posterior margin very slightly curved, base and apex about about equal in breadth; tergum 6 shining, only very vaguely and minutely punctate if at all, very slightly ridged medially toward the narrowly rounded apex.

WORKER—Length 12-14 mm., breadth of abdomen 5-6 mm.; pubescence somewhat more copious and elongate than in queen, bright yellow above, that on pleura somewhat more whitish or possibly largely black; terga 1 and 2 entirely pale yellow pubescent, 3 either entirely black or with largely yellow pubescence medially, becoming intermixed with black hairs laterally, the more apical terga largely black but with intermixed paler hairs, especially on tergum 6; resembles queen in most other details.

MALE—Length 13-14 mm., breadth of abdomen 5-6 mm.; black, mandibles more or less ferruginous at tip, apical segments of legs somewhat more piceous, mid and hind spurs piceous to black, tegulae piceous; wings rather lightly but uniformly infuscated, veins pale testaceous to piceous; pubescence long and copious, largely whitish on head, with a few elongate, dark hairs along inner orbits, before ocelli, and on vertex laterally, vertex otherwise more yellowish pubescent, more whitish on cheeks below, the shorter pubescence of face very fine and densely plumose; pubescence of thorax entirely pale, bright yellow above, more whitish beneath, the legs, including the femora, whitish pubescent basally, mid trochanters with some short curved ochraceous bristles; tibiae with some very short, dark pubescence anteriorly but rather prominantly fringed with pale hairs posteriorly, the basitarsi with brownish pubescence beneath; clypeus somewhat shining between fine but rather close and distinct punctures beneath the dense pubescence; labrum quite broadly rounded, more or less truncate medially, somewhat shining on each side basally, the median apical area with scattered, shallow punctures; mandibles slender, distinctly bidentate apically, outer surface densely yellow tomentose, lower margin with a fringe of elongate, more or less curled, yellowish hairs; malar space smooth and shining, only very vaguely punctate except below, its length slightly greater than basal width of mandible, about one-fourth length of eye; median area of face very finely and closely punctate beneath dense pubescence, punctures becoming quite coarse and rather sparse toward ocelli, space between ocelli and eyes largely polished and impunctate; vertex finely and very densely punctate medially, becoming somewhat more distinctly, sparsely and finely punctate laterally, area between eyes and ocelli shining and impunctate; lateral ocelli subequally distant from margin of vertex and each other, very slightly closer to eyes; basal segment of flagellum very slightly longer than segment 2, very slightly shorter than 3; hind tibiae convex on outer face, shining, very sparsely punctate; hind basitarsus nearly parallel-sided, slightly narrowed at base, length about three and one-third times the maximum breadth; sterna 7 and 8 and genital armature as in *impatiens* (fig. 133).

DISTRIBUTION — Alaska to Maine, south to Georgia, April to September.

FLOWER RECORDS — *Angelica, Hydrangea, Malus, Rhododendron, Rubus* and *Vaccinium*.

Bombus sandersoni Franklin

Bombus vagans sandersoni Franklin, 1913. Amer. Ent. Soc. Trans. 38, p. 353. ♀.

QUEEN—Length 15-16 mm., breadth of abdomen 6 mm.; black, the more apical segments of the legs becoming brownish-testaceous, mid and hind spurs testaceous, tegulae brownish-piceous; wings lightly infuscated, being almost hyaline in central area, veins pale testaceous to piceous; pubescence copious but rather short, largely pale on head, with long, erect, black hairs on vertex and front, a small amount of short, greyish, densely plumose hairs around antennae, cheeks below becoming somewhat more greyish pubescent, and a few pale hairs intermixed with the dark on vertex; pubescence dense, erect and yellow on pronotum, tubercles, narrow anterior margin of scutum, most of pleura, propodeum

laterally, and entire scutellum, that on venter somewhat more greyish, largely fuscous on legs but largely pale on coxae and trochanters, mid trochanters with a patch of short, curved, brownish bristles beneath; front and mid tibiae with rather elongate pubescence posteriorly and on outer face, the corbicular fringe on hind legs of very long, dark hairs; tarsal segments thinly covered with very fine, pruinose hairs that do not obscure the surface, basitarsi beneath with brownish pubescence; abdominal terga 1 and 2, and sometimes 5 and 6, yellow pubescent, with no dark mixture on 1 or 2, terga 3 with erect and copious black pubescence; clypeus quite finely, closely and deeply punctate laterally and above, broad median area shining and nearly impunctate; mandible with a basal ridge which is somewhat interrupted medially, this area somewhat depressed, its apex very slightly elevated above margin on each side, and fringed with short, ochraceous hairs; apex of mandibles with a pair of distinct and rather deep notches toward upper angle, very slightly and rather broadly emarginate toward lower angle, outer face toward base smooth and somewhat shining, with only minute and very vague punctures; malar space shining and impunctate, slightly shorter than basal width of mandible, about one-fourth length of eye; punctures over median area of face very fine and rather densely crowded, becoming more distinct but still quite close toward ocelli, largely shining and impunctate between ocelli and eyes; vertex medially with very fine, densely crowded punctures, these becoming somewhat more distinct but still very fine and close laterally; lateral ocelli subequally distant from eyes and margin of vertex, somewhat more widey separated from each other; antennal scape somewhat more than half the total length of flagellum, basal segment of flagellum considerably longer than either 2 or 3, but somewhat shorter than the two combined; hind basitarsus almost parallel-sided, posterior margin only very slightly curved, median length nearly twice the breadth; tergum 6 somewhat shining, very minutely and rather sparsely punctate medially, more closely so toward margins, apex narrowly rounded, very densely short pubescent, forming an apical tuft.

WORKER—Length 8-13 mm., breadth of abdomen 3.5-5.5 mm.; resembles queen, but pubescence relatively more elongate, with the same general pattern except that the apical abdominal terga are usually entirely black pubescent.

MALE—Length 10-13 mm., breadth of abdomen 5-6 mm.; pubescence long and copious, in large part yellow on head, especially on face below antennae, on vertex medially and cheeks posteriorly, with intermixed, long, black hairs along inner orbits, around and above antennae, behind ocelli, on cheeks above and along posterior orbits; center of scutum thinly pubescent, usually posterior half black, the scutellum, pleura and anterior half of scutum yellow; legs largely yellow pubescent basally, hairs long and quite copious, tibiae with somewhat shorter pubescence on outer face, fringed with pale hairs, more or less intermixed with black, the mid and hind basitarsi with brownish-ochraceous pubescence beneath, largely bare on exterior surface, fringed with ochraceous hairs; hind tibiae quite slender, outer surface shining but convex, with sparse punctures, fringed with dark hairs anteriorly, and with more elongate, pale hairs, intermixed with dark, posteriorly; abdominal terga 1 and 2 with copious and elongate yellow pubescence, following terga black; clypeus with fine and close but quite distinct punctures beneath dense yellow pubescence; labrum rather broadly truncate, smooth and shining, with only minute scattered and rather obscure punctures; mandibles slender, bidentate apically, densely covered with ochraceous pubescence on outer face, this forming an elongate, somewhat curled fringe beneath; malar space smooth and shining, with only very vague and obscure punctures, length somewhat greater than basal width of mandible, about one-fourth length of eye; median area of face beneath the dense pubescence very finely and closely punctate, the punctures becoming distinct and quite sparse above toward ocelli, space between ocelli and eyes shining and impunctate, vertex medially quite closely punctate becoming more sparse and irregular laterally; lateral ocelli subequally distant from eyes, margin of vertex and each other; basal segment of flagellum very slightly longer than segment 2, about equal to segment 3; median width of hind basitarsus slightly less than one-third the length; sterna 7 and 8 and genital armature similar to *impatiens* (fig. 133).

DISTRIBUTION — Ontario to Newfoundland, south to Tennessee and North Carolina, April to October.

FLOWER RECORDS—*Epilobium, Malus, Pentstemon, Rhododendron,* and *Rubus.*

Although *sandersoni* was originally described as a form of *vagans,* it has more recently been placed under *frigidus* (Catalog of Hymenoptera, p. 1252). However, Milliron has expressed the opinion in correspondence that it is distinct and that neither typical *frigidus* nor any of its forms occurs in the East.

Bombus ternarius Say

Bombus ternarius Say, 1837. Boston Jour. Nat. Hist. 1, p. 414. ♂.
(?) *Bombus ornatus* Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 398. ♀ ♂ ☿.
Bombus ternarius var. *expallidus* Cockerell, 1916. Mich. Univ. Mus. Zool. Occas. Papers 23, p. 9. ♀.
Bombus ternarius Plath, 1927. Psyche 34, p. 125. (biology)
Bombus ternarius Brittain and Newton, 1933. Canad. Jour. Res. 9, p. 343. (flower records)
Bombus ternarius Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 149. (biology)

QUEEN—Length 17-19 mm., breadth of abdomen 8.5-9 mm.; black, legs apically and spurs and tegulae more piceous; wings uniformly and rather deeply infuscated, veins brownish to piceous; pubescence copious and dense but rather short, largely black on head, with a few pale yellowish hairs around antennae and some intermixed pale hairs on vertex medially, otherwise erect and black on vertex, front of face and on cheeks; pubescence yellow and erect on pronotum, anterior margin of scutum, posterior margin of scutellum, tubercles, and mesopleura to bases of legs, black on scutum in large part, and on scutellum medially, propodeal area with more or less intermixed light and dark hairs; pubescence pale on basal segments of legs, elongate and largely black on femora, with only a few pale hairs at base, short on tibiae and tarsi, the corbicular fringe of quite elongate, blackish hairs, and hind basitarsus thinly covered with pale pruinose hairs which do not obscure the surface; abdominal terga 1 and 4 yellow pubescent, 2 and 3 fulvous, unless faded, 5 and 6 entirely black; clypeus shining, punctures close and rather fine laterally and above, the broad median area with sparse shallow punctures of two different sizes; labrum with a basal ridge that is narrowly interrupted medially, this area somewhat excavated, its apical margin broadly rounded, somewhat elevated above the margin on each side, the entire margin fringed apically with rather short yellowish hairs; apex of mandible with two rather deep notches near upper angle, outer surface smooth but rather dull, with some minute and very vague punctures; malar space smooth and shining, without distinct punctures, somewhat shorter than basal width of mandible, about one-fifth length of eye; median area of face very finely and closely punctate, punctures becoming somewhat more distinct and more widely separated toward ocelli, space between lateral ocelli and eyes smooth and impunctate or nearly; vertex very finely and densely punctate medially, punctures becoming somewhat more distinct but still close laterally; lateral ocelli subequally distant from eyes, margin of vertex and each other; antennal scape somewhat more than half the total length of flagellum, basal segment of flagellum only slightly shorter than 2 and 3 combined, the latter nearly equal; posterior margin of hind basitarsus very slightly curved, base and apex of nearly equal width; tergum 6 smooth and shining, with exceedingly minute, rather sparse punctures, apex rather broadly rounded.

WORKER—Length 8-13 mm., breadth of abdomen 4.5-5.5 mm.; closely resembles queen except in size.

MALE—Length 9.5-13 mm., breadth of abdomen 4.5-5.5 mm.; black, legs and tegulae more piceous, spurs reddish-piceous; wings subhyaline, veins pale testaceous or yellowish to dark brownish; pubescence long and copious, largely yellow on head but with erect and elongate black hairs along margin of eyes, across upper part of face above antennae, just posterior to ocelli, on cheeks above and vertex laterally; posterior two-thirds of scutum and anterior median area of scutellum in part, black pubescent, otherwise thorax with entirely yellow, dense, copious and erect pubescence; pubescence of legs largely pale, quite elongate but with some blackish hairs on mid femora above and on front and mid tibiae posteriorly; abdominal terga 1 and 4 yellow pubescent, 2 and 3 bright fulvous, unless faded, 5-7 black, bordered with yellow laterally; clypeus with fine and close punctures beneath dense pubescence; labrum broadly truncate, shining, with shallow and minute, irregular punctures; mandibles slender, bi-dentate apically, the two teeth nearly equal, outer surface densely yellow pubescent, lower margin fringed with elongate, more or less curled hairs; malar space smooth and shining, with only very obscure, minute punctures at all evident, length about equal to basal width of mandible; median area of face beneath dense pubescence very finely and closely punctate, punctures becoming more distinct and more widely separated toward ocelli, space between lateral ocelli and eyes shining and largely impunctate, but with a few punctures toward the eyes; punctures of vertex fine and densely crowded medially, becoming somewhat more distinct but still very close laterally; lateral ocelli subequally distant from eyes, margin of vertex and each other; basal segment of flagellum very slightly shorter than segment 3, very slightly longer than segment 2; hind tibiae shining and nearly impunctate on the convex outer surface, fringed with elongate pale hairs; hind basitarsus gradually narrowed toward the

base which is considerably narrower than the apex; sterna 7 and 8 and genital armature as in *impatiens* (fig. 133).

DISTRIBUTION—Yukon to Nova Scotia, south to Georgia, May to October. This species is rarely observed south of Pennsylvania.

FLOWER RECORDS—*Asclepias, Rubus, Solidago* and *Vaccinium.* Brittain and Newton (1933) record *ternarius* on *Chrysanthemum, Cirsium, Daucus, Narcissus, Pinus(?), Pyrus malus, Rhododendron, Taraxacum* and *Tulipa.*

Bombus vagans Smith

Bombus vagans Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 399. ♀.

Bombus consimilis Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 41. ♀.

Bombus vagans Plath, 1922. Psyche 29, pp. 197-198. (biology)

Bremus vagans var. *coctus* Bequaert and Plath, 1925. Mus. Compar. Zool. Bul. 67, p. 276. ♀ ♂.

Bremus vagans var. *helenae* Frison, 1929. Amer. Ent. Soc. Trans. 55, p. 110. ♀ ♂.

Bombus consimilis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Bombus vagans Frison, 1930. Brooklyn Ent. Soc. Bul. 25, pp. 109-122. (biology)

Bremus vagans Brittain and Newton, 1933. Canad. Jour. Res. 9, p. 343. (flower records)

Bombus vagans Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 151. (biology)

QUEEN—Length 14.5-19 mm., breadth of abdomen 6-8.5 mm.; black, legs often somewhat reddened, mid and hind spurs and tegulae reddish-piceous; wings very lightly and rather uniformly infuscated, veins brownish to piceous; pubescence copious and rather elongate, largely black on head, but with a dense tuft of yellowish hairs on vertex medially and a few pale hairs beneath the more elongate black pubescence around antennae; thorax almost entirely yellow pubescent, but median posterior area of scutum bare and somewhat shining, more or less fringed with obscure black hairs; pubescence of legs largely black, somewhat intermixed with greyish on front femora, pubescence short and largely dark on front tibiae, much more elongate posteriorly and entirely dark on mid tibiae; corbicular fringe on hind legs of elongate black hairs, and hind basitarsi rather densely covered with very minute, yellowish, pruinose hairs that do not hide the surface; abdominal terga 1 and 2 yellow pubescent, that on 2 becoming narrowly blackish apically in many specimens, entirely black on 3-6; clypeus smooth and shining, with only a narrow band of close punctures along lateral and upper margins, with only very minute and sparse punctures otherwise; labrum with a very low, basal ridge which is quite broadly interrupted medially, this area concave, with margin somewhat elevated above that on each side, surface smooth and shining on each side, with only a few scattered punctures, the median concave area finely rugose or subpunctate, apical margin fringed with rather short ochraceous hairs; apex of mandible with a pair of rather deep notches toward the upper angle, otherwise broadly rounded, outer face rather smooth, somewhat shining, with exceedingly minute, obscure punctures; malar space smooth and shining, without distinct punctures, its median length slightly greater than basal width of mandible; median area of face very finely and closely punctate, punctures becoming more deep, distinct and rather sparse below ocelli, space between lateral ocelli and eyes shining and impunctate; punctures of vertex minute, close laterally, densely crowded medially; lateral ocelli slightly nearer eyes than to margin of vertex, somewhat more distinct from each other; antennal scape somewhat more than half total length of flagellum, basal segment of flagellum longer than 2 or 3, but somewhat shorter than the two combined; median width of hind basitarsus nearly equal to half the length, apex slightly narrower; tergum 6 rather smooth but dull, punctures exceedingly minute but rather close, with rather copious but short, fine pubescence, narrowly rounded apically.

WORKER—Length 6-15.5 mm., breadth of abdomen 3.5-6.5 mm.; very similar to queen except in size; often with median posterior area of scutum more copiously black pubescent.

MALE—Length 11-13 mm., breadth of abdomen 4.5-5.5 mm.; pubescence long and copious, in large part yellow on head, especially on face below antennae, on vertex medially and cheeks posteriorly, with intermixed, long, black hairs along inner orbits, around and above antennae, behind ocelli, on cheeks above and along posterior orbits; center of scutum somewhat bare, fringed with elongate, black hairs, with a few black hairs intermixed with the yellow toward the lateral margins; thorax otherwise entirely bright yellow pubescent; legs largely yellow pubescent basally, hairs long and quite copious, tibiae with somewhat shorter, black pubescence on outer face, fringed with pale hairs more or less intermixed with black, the mid and hind basitarsi with brownish-ochraceous pubescence beneath,

largely bare on exterior surface, fringed with ochraceous hairs; hind tibiae quite slender, outer surface shining but convex, with sparse punctures, fringed with dark hairs anteriorly, and with more elongate, pale hairs, intermixed with dark, posteriorly; abdominal terga 1 and 2 with copious and elongate yellow pubescence, following terga black, but with some intermixed yellowish hairs on the more apical segments, and margins with more or less evident yellowish pubescence; clypeus with fine and close but quite distinct punctures beneath dense pubescence; labrum rather broadly truncate, smooth and shining, with only minute, scattered and rather obscure punctures; mandibles slender, bi-dentate apically, densely covered with ochraceous pubescence on outer face, this forming an elongate, somewhat curled fringe beneath; malar space smooth and shining, with only very vague and obscure punctures, length somewhat greater than basal width of mandible, about one-fourth length of eye; median area of face beneath the dense pubescence very finely and closely punctate, the punctures becoming distinct and quite sparse above toward ocelli, space between ocelli and eyes shining and impunctate, vertex medially with deep and distinct but quite close punctures, becoming somewhat more irregular but still close laterally; lateral ocelli subequally distant from eyes, margin of vertex and each other; basal segment of flagellum very slightly longer than segment 2, and very slightly shorter than segment 3; median width of hind basitarsus slightly less than one-third the length; sterna 7 and 8 and genital armature as in *impatiens* (fig. 133).

DISTRIBUTION—Ontario to Nova Scotia, south to Georgia, June to August.

FLOWER RECORDS—*Asclepias, Aster, Azalea, Betula, Cirsium, Eupatorium, Helianthus, Hydrangea, Malus, Pentstemon, Rubus, Solidago, Spirea* and *Vaccinium*. Robertson (1929) records *vagans* on *Actinomeris, Agastache, Amphicarpa, Arctium, Asclepias, Aster, Blephilia, Cassia, Cercis, Cirsium, Claytonia, Clematis, Delphinium, Dicentra, Ellisia, Erigenia, Eupatorium, Geranium, Gerardia, Helianthus, Hydrophyllum, Hypericum, Ipomoea, Liatris, Linaria, Lobelia, Malva, Mertensia, Mimulus, Monarda, Nepta, Pentstemon, Phlox, Physostegia, Polygonatum, Polymonium, Prunella, Ribes, Scrophularia, Scutellaria, Seymeria, Silphium, Solidago, Stachys, Staphylea, Symphoricarpus, Teucrium, Tradescantia, Trifolium, Triosteum, Verbascum, Verbena, Veronica, Viola* and *Zizia*. Brittain and Newton record *vagans* on the following: *Caragana, Daucus, Narcissus, Phleum, Pinus, Prunus, Pyrus, Salix, Spiraea, Taraxacum, Tulipa*, and *Vaccinium*.

Psithyrus Lepeletier

Psithyrus Lepeletier, 1832. Soc. Ent. France Ann. 1, p. 372. Type: *Apis rupestris* Fabricius. Desig. by Curtis, 1833.

Apathus Newman, 1835. Ent. Mag. 2, p. 404 (footnote). Type: *Apis rupestris* Fabricius. Autobasic.

Psithyrus subg. *Ashtonipsithyrus* Frison, 1927. Amer. Ent. Soc. Trans. 53, p. 69. Type: *Apathus ashtoni* Cresson. Orig. desig.

Psithyrus subg. *Fernaldaepsithyrus* Frison, 1927. Amer. Ent. Soc. Trans. 53, p. 70. Type: *Psithyrus fernaldae* Franklin. Orig. desig.

Psithyrus Milliron. 1961. Kans. Ent. Soc. Jour. 34, p. 59.

These parasitic bees are closely related to the bumblebees which are their hosts. Correlated to their parasitic habit, the pollen baskets or corbiculae, characteristic of this family Apidae, are lacking, and the hind tibiae of the females are slender, convex, closely punctate and well covered with short pubescence. Males are somewhat more difficult to distinguish from their hosts, but the hind tibiae in this sex also are more evenly convex on the outer surface, more closely punctate and more densely pubescent than those of the host species. The genital structures are very different, however, the gonostyli being much more elongate in *Psithyrus*, extending much beyond the tips of the gonocoxites or penis valves.

It has been shown (p. 333) that *Laboriopsithyrus* Frison is a junior homonym of *Emphoropsis*. As the other two subgenera proposed by Frison have been placed in synonymy by Milliron (1961), it is not deemed necessary to propose a new name replacing *Laboriopsithyrus*, for it also would be placed in synonymy.

KEY TO SPECIES

Females

1. General aspect of abdomen black, with no dorsal pale pubescence 2
   Abdominal terga 3-5 yellow pubescent in part 3

2. Posterior half of scutum black pubescent; hairs covering abdominal terga very short and only suberect .... *variabilis* (Cresson) (p. 534)

Scutum with only a small amount of black pubescence medially on posterior half; abdominal terga covered with dense, erect, black pubescence, the individual hairs nearly half the length of the plate ..... *citrinus* (Smith) (p. 540)

3(1). Apical sternum elongated beyond tip of tergum, this slender projection downcurved; pleura, vertex and scutellum yellow pubescent .... *fernaldae* Franklin (p. 541)

Apical sternum not produced beyond its tergum; pleura, vertex and scutellum black pubescent at least in part 4

4. Pubescence of head largely black, that of tergum 4 entirely yellow .... *ashtoni* (Cresson) (p. 539)

Head yellow pubescent in part, and tergum 4 with at least some black pubescence 5

5. Abdominal terga 3-5 yellow pubescent laterally, black medially .... *insularis* (Smith) (p. 542)

Tergum 3 largely yellow pubescent, 4 and 5 black .... *citrinus* (Smith) p. 540)

Males

1. Segment 3 of flagellum little if any longer than basal segment; abdominal tergum 4 pale pubescent 2

Segment 3 considerably longer than basal segment of flagellum, often equal to segments 1 and 2 combined 3

2. Pubescence of pleura dark in large part; gonostyli of genital armature broad and flat, subtriangular, acute apically ..... *ashtoni* (Cresson) (p. 539)

Pleura largely pale pubescent; gonostyli slender, abruptly dilated at base .... *fernaldae* Franklin (p. 541)

3(1). Hypoepimeral area and posterior half of mesopleura fuscous or black pubescent; segment 3 of flagellum shorter than 1 and 2 combined; pubescence of abdominal terga relatively short .... *variabilis* (Cresson) (p. 543)

At least upper half of mesopleura, including hypoepimeral area, covered with yellow pubescence 4

4. Abdominal terga 1 and 2 yellow pubescent, 3-7 black, often with some black intermixture across base of 2, or with some yellow hairs among the black on 3 ... . *citrinus* (Smith) (p. 540)

Abdominal terga 1-3 entirely yellow pubescent 5

5. Abdominal terga 4-7 entirely black pubescent ..... *citrinus* (Smith) (p. 540)

Tergum 4 largely yellow pubescent, and 5 and 6 with some yellow hairs along lateral margins .... *insularis* (Smith) (p. 542)

Psithyrus ashtoni (Cresson)

Apathus ashtoni Cresson, 1864. Ent. Soc. Phila. Proc. 3, p. 42. ♀.

Psithyrus ashtoni Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 169. (biology)

FEMALE—Length 17-18 mm., breadth of abdomen 8-8.5 mm.; black, apical tarsal segments becoming brownish-testaceous, spurs testaceous; wings lightly infuscated, veins testaceous to piceous; pubescence of scutum and scutellum pale yellowish, with a limited area of fuscous on scutum posteriorly, yellow on tubercles and adjacent area of pleura, otherwise fuscous or black on head, thorax and legs; abdominal terga 1-3 with erect fuscous pubescence, that on 4 conspicuously yellow, more elongate laterally, and tergum 5 with elongate, fuscous pubescence, sterna with relatively thin, dark pubescence throughout; clypeus closely and finely punctate; labrum triangularly produced at base on each side, median area depressed, densely fringed apically with fuscous hairs; apex of mandible faintly crenulate but not distinctly dentate, outer face somewhat shining, with a few, minute, irregular punctures; malar space shining with distinct punctures, somewhat shorter than basal width of mandible, eye nearly 5 times as long; lateral ocelli subequally distant from eyes and each other, this about half the distance to margin of vertex; scape somewhat more than half the length of the flagellum, basal segment of flagellum slightly longer than segment 3, and 3 slightly longer than 2; facial punctures below ocelli and on vertex medially very fine and close, becoming more shining and somewhat more sparsely punctate laterally, a shining area adjacent to each lateral ocellus impunctate; median posterior area of scutum shining, with rather coarse, deep, distinct and somewhat separated punctures, otherwise punctures of thorax very fine and close; sternum 6 not protuberant, subtriangular, smooth and shining medially, slightly elevated laterally just before apex.

MALE—Length 12-16 mm., breadth of abdomen 5-7 mm.; black, apical tarsal segments brownish-testaceous, spurs testaceous; wings very faintly infuscated, veins yellowish to piceous; pubescence of head long and erect, largely black, with only a very few intermixed

pale hairs on vertex; anterior half of scutum and area around tubercles with long, copious, erect, yellowish pubescence, this extending narrowly along margins of scutum, posterior half largely covered with blackish pubescence; scutellum with intermixed, short, black hairs and long yellow hairs; thorax otherwise black pubescent laterally, posteriorly and beneath; legs largely black pubescent basally, the basitarsi more or less conspicuously fringed with elongate, fuscous hairs, apical tarsal segments with relatively short, pale pubescence; abdominal terga 1 and 4 pale yellowish pubescent, hairs long and copious; terga 2 and 3 and 5-7 black pubescent, at least medially, 5 and 6 with elongate yellowish hairs evident laterally; clypeus and labrum quite closely and finely punctate, apical margin quite strongly depressed, evenly rounded; mandibles very short, with a small subapical tooth near the tip above, and with a prominant fringe of elongate fuscous hairs below, outer surface rather dull and impunctate; malar space smooth and shining, very slightly shorter than basal width of mandible, eye about five times as long; lateral ocelli very slightly nearer eyes than to each other, much more widely removed from margin of vertex; segment 3 of flagellum very slightly longer than basal segment, segment 2 much shorter; sterna 7 and 8 and genital armature similar to *variabilis* (fig. 134).

DISTRIBUTION—Saskatchewan to New Brunswick, south to Michigan, Ohio and the New England States, May to October.

FLOWER RECORDS—*Vaccinium.*

HOSTS—Plath (1934) lists *Bombus affinis* and *B. terricola* as hosts of *ashtoni.*

Psithyrus citrinus (Smith)

Apathus citrinus Smith, 1854. Cat. Hym. Brit. Mus. 2, p. 385. ♂.

Apathus contiguus Cresson, 1863. Ent. Soc. Phila. Proc. 2, p. 112. ♂.

Psithyrus laboriosus Frison, 1921. Canad. Ent. 53, p. 100. (biology)

Psithyrus laboriosus Bequaert and Plath, 1925. Mus. Compar. Zool. Bul. 67, pp. 268-272.

Psithyrus laboriosus Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

Psithyrus laboriosus Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 175. (biology)

FEMALE—Length 17-21 mm., breadth of abdomen 7-9.5 mm.; black, the apical tarsal segments brownish, mid and hind spurs brownish-testaceous and tegulae brownish-piceous; wings uniformly lightly infuscated, veins testaceous to piceous; vertex with a median area of rather short, yellowish pubescence, somewhat interspersed with black hairs, pubescence of head otherwise entirely black, rather short, but erect and copious; pubescence yellow, quite dense and copious but rather short on scutum, scutellum and pleura, the venter narrowly black pubescent, propodeum with some dark pubescence at sides, and scutum with a few short black hairs adjacent to a median, polished, impunctate and more or less bare area; legs black pubescent, with pale hairs only on the more apical tarsal segments; abdomen entirely black pubescent, the hairs quite dense and erect but very short; clypeus closely and finely punctate above, becoming somewhat more coarsely so medially and at sides, apical margin rather broadly shining, sparsely and minutely punctate; labrum somewhat excavated medially, with a basal, triangular protuberance on each side, apical margin quite abruptly depressed; apex of mandible with a rather deep median notch, outer surface shining, punctures exceedingly minute and sparse; malar space smooth and shining, with exceedingly minute, indefinite, rather close punctures, somewhat shorter than basal width of mandible, and one-fourth length of eye; space between lateral ocelli and margin of vertex fully twice that between ocelli and eyes, subequally distant from eyes and each other; scape very slightly more than half the length of the flagellum, segments 1 and 3 of flagellum subequal in length, considerably tonger than segment 2 which is slightly broader than long; punctures of face quite close and rather coarse, becoming sparse between eyes and ocelli; vertex very closely and finely punctate medially, becoming more coarsely and sparsely so laterally; sternum 6 not protuberant, disc somewhat depressed between the quite strongly elevated lateral and apical margins, obscurely rounded apically.

MALE—Length 13-15 mm., breadth of abdomen 5-6 mm.; black, apical tarsal segments more brownish-piceous, mid and hind spurs reddish and tegulae piceous; wings lightly infuscated, veins testaceous to piceous; head largely black pubescent, with a few yellowish hairs interspersed among the black across vertex posteriorly; scutum anteriorly, tubercles and adjacent area below with copious, elongate, yellow pubescence, scutellum fringed with long yellow pubescence posteriorly; pubescence otherwise black on scutum, scutellum, pleura, propodeum and legs, with short, inconspicuous pale hairs only on the more apical tarsal segments; abdominal terga 1 and 2 with elongate, copious and erect, yellowish

pubescence, with possibly some black hairs on 2 basally toward the sides, and 3 sometimes with yellowish pubescence at extreme sides, but 3 medially and 4-6 or 7 entirely black pubescent, the hairs copious, elongate and erect; clypeus very finely and closely punctate except along apical margin medially; labrum somewhat shining, with a transverse line of erect, black hairs, surface somewhat shining below, margin shallowly depressed, broadly truncate; mandibles quite short, distinctly bidentate apically, densely pubescent on outer surface toward base, the lower margin fringed with elongate, somewhat curved dark hairs; face very finely and closely punctate but becoming quite sparsely and more coarsely so above, around ocelli and across vertex; punctures of vertex medially quite close, ocelli surrounded in part by a shining, impunctate area laterally and below; malar space smooth and shining, very minutely and sparsely punctate, median length slightly less than basal width of mandibles, about one-fifth length of eyes; lateral ocelli very slightly nearer eyes than to each other, somewhat more widely removed from margin of vertex; segment 3 of flagellum considerably longer than segment 1, and this longer than segment 2 which is about as long as broad; sterna 7 and 8 and genital armature similar to *variabilis* (fig. 134).

DISTRIBUTION — Ontario to New Brunswick, south to Alabama and Georgia, May to October.

FLOWER RECORDS — *Asclepias, Pycnanthemum* and *Rubus*. Recorded by Robertson (1929) on *Blephilia, Cirsium, Trifolium,* and *Verbena.*

HOSTS—Plath (1934) has found this *Psithyrus* breeding in nests of *Bombus vagans* and *B. impatiens.*

Psithyrus fernaldae Franklin

(Fig. 134)

Psithyrus fernaldae Franklin, 1911. Amer. Ent. Soc. Trans. 37, p. 164. ♀.

Psithyrus tricolor Franklin, 1911. Amer. Ent. Soc. Trans. 37, p. 167. ♂.

Psithyrus fernaldae Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 171. (biology)

FEMALE—Length 14.5-17 mm., breadth of abdomen 7-8.5 mm.; black, tibial spurs reddish-piceous; wings rather uniformly, lightly infuscated, veins brownish to piceous; pubescence of face and cheeks black, vertex with copious and elongate, yellow pubescence, with a few intermixed yellowish hairs just above antennae; thorax with long and copious, largely yellowish pubescence, but scutum with a median posterior patch of fuscous pubescence; pleura beneath and legs largely dark pubescent, but posterior fringe of front femora pale in part; pubescence of abdominal terga erect and copious, intermixed yellowish and fuscous on basal tergum, largely fuscous on terga 2 and 3, with some yellowish hairs along apical margin, and laterally also on 3, tergum 4 yellow pubescent, 5 black pubescent, 6 with only very short and inspicuous, appressed pubescence; clypeus shining, punctures fine, rather deep and distinct along lateral and upper margins, becoming very minute and sparse apically; labrum slightly excavated medially, the basal margin slightly produced on each side, apical margin rounded, rather strongly depressed; apex of mandible entire, outer face smooth and shining, punctures exceedingly minute and indefinite; malar space smooth and shining, length fully equal to basal width of mandible, about one-fourth length of eye; lateral ocelli subequally distant from eyes and each other, somewhat more widely removed from margin of vertex; punctures of face and of vertex medially fine and close, vertex becoming more shining and more minutely and sparsely punctate laterally, a shining area adjacent to each lateral ocellus nearly impunctate; flagellum fully twice the length of the scape, its basal segment very slightly longer than segment 3, and 3 slightly longer than 2; scutum with a median, shining, impunctate space, punctures otherwise rather fine and close over most of thorax; sternum 6 elongate, produced beyond apex of the tergum, its tip somewhat down-curved, lateral margins very slightly elevated medially, the narrower apex densely, pale, short pubescent.

MALE—Length 13-15 mm., breadth of abdomen 6-7 mm; black, tarsal segments becoming brownish-testaceous apically, mid and hind spurs brownish-piceous; wings lightly but quite uniformly infuscated, veins testaceous to piceous; pubescence of face and cheeks entirely black, quite long and copious, vertex with elongate, copious, yellowish pubescence; thorax with long, copious, largely yellow pubescence but posterior half of scutum with copious, erect, black pubescence, that on venter fuscous in part; legs with intermixed light and dark hairs, the posterior fringes of femora and basitarsi largely pale; abdominal terga 1 and 4 with elongate, yellowish pubescence, 2 3, 5, and 6 with largely black pubescence, that on 7, and on 6 laterally, yellowish; clypeus very finely and closely punctate, rather dull; labrum shining, punctures minute and to some degree separated, apical margin

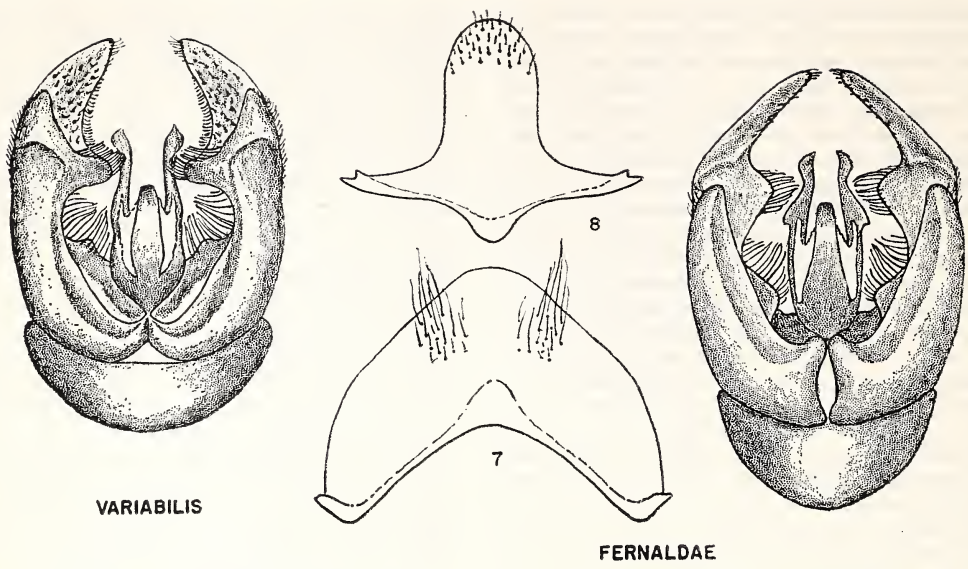


Figure 134—Dorsal view of genital armature in male of *Psithyrus variabilis*, and sterna 7 and 8, and armature of *P. fernaldae*.

only slightly depressed, broadly subtruncate, with a transverse, median line of erect black hairs separating the lower and upper surfaces; mandibles small but quite distinctly bidentate at apex, with a rather prominant fringe of elongate pale hairs below; malar space smooth and shining, with only exceedingly minute, well separated punctures, length equal to basal width of mandible; eye about four and one-half times longer; lateral ocelli slightly nearer eyes than to margin of vertex, subequally distant from eyes and each other; segments 1 and 3 of flagellum about equal in length, somewhat longer than segment 2 which is about as broad as long; sterna 7 and 8 and genital armature as shown (fig. 134).

DISTRIBUTION — Widespread in Canada and the United States, from Alaska to California in the West, New Brunswick to North Carolina in the East, June to September.

FLOWER RECORDS—*Potentilla, Rubus* and *Trifolium.*

HOST—Plath (1934) suggests the possibility that *Bombus perplexus* is the host of *fernaldae*, but positive evidence is lacking.

Psithyrus insularis (Smith)

Bombus interruptus Greene, 1858. Lyc. Nat. Hist. N. Y. Ann. 7, p. 11. ♀. (Preocc.)

Apathus insularis Smith, 1861. Journ. of Ent. 1, p. 155. ♀.

Psithyrus consultus Franklin, 1913. Amer. Ent. Soc. Trans. 38, p. 459. ♂.

Psithyrus insularis Plath, 1934. Bumblebees and their ways, New York, Macmillan, p. 173. (biology)

FEMALE—Length 16-19 mm., breadth of abdomen 8-9 mm.; black, the tarsi piceous, tegulae brownish-testaceous, wings rather lightly infuscated, veins testaceous to blackish; face and cheeks largely black pubescent, but with erect, rather copious, yellowish pubescence between and above the antennae and on vertex; pubescence of thorax long and copious, pale yellowish in large part, but venter and posterior half of scutum largely black pubescent; legs with short, largely black pubescence; abdominal terga 1 and 2 with dense black pubescence, 3 and 4 yellow pubescent laterally but black medially, 5 largely black, but with some elongate, yellowish hairs at each extreme side, tergum 6 nearly bare; clypeus quite coarsely, closely and deeply punctate laterally, more finely so along upper margin, median apical area shining, with very minute and sparse punctures; labrum slightly excavated medially, basal area on each side triangularly produced, the projecting lip beyond this medially with a slightly elevated margin, the apical margin rather broadly rounded and considerably depressed; apex of mandible with a very slight, median notch, outer surface shining, with only extremely minute, scattered and obscure punctures evident; malar space shining, very irregularly and minutely punc-

tate, median length about two-thirds basal width of mandible, and about one-third length of eye; lateral ocelli subequally distant from eyes and each other, distance to margin of vertex about twice as great; scape slightly more than half the length of the flagellum, segments 1 and 3 of flagellum about equal, segment 2 considerably shorter and slightly broader than long; sternum 6 shining, rather broadly rounded apically, strongly swollen on each side medially, with a quite dense, apical fringe of very short, brownish hairs.

MALE—Length 13-16 mm., breadth of abdomen 4-5.5 mm.; black, apical tarsal segments and spurs more piceous; tegulae brownish-testaceous; wings uniformly but lightly infuscated, veins testaceous to piceous; vertex with a median patch of elongate, yellow pubescence and a small amount of yellow just above antennae medially, head otherwise with copious and elongate, black pubescence; posterior half of scutum black pubescent, with a small amount of black on scutellum medially, the venter of thorax and lateral margins of propodeum black in part, otherwise pleura, scutum anteriorly, scutellum posteriorly and posterior face of propodeum with elongate, copious, yellow pubescence; legs black pubescent basally, becoming somewhat paler on the tarsal segments, the posterior fringes of sparse, elongate, pale hairs; abdominal terga 1-4 with copious, rather elongate, yellowish pubescence, 5-7 with black, a small amount of yellow on 6 laterally; clypeus finely, closely and deeply punctate in general, only the apical margin narrowly shining and impunctate medially; labrum shining, punctures minute, apical margin broadly subtruncate, only slightly depressed, with a transverse fringe of short, erect, black hairs; mandibles short and slender, distinctly bidentate apically, outer surface quite densely pubescent, lower margin with a fringe of elongate, more or less curved, fuscous hairs; malar space shining, with only very minute, scattered punctures, median length somewhat less than basal width of mandibles about one-fifth length of eye; lateral ocelli subequally distant from eyes and each other, distance to margin of vertex only slightly greater; punctures of face very fine and densely crowded, vertex medially with densely crowded but rather fine striate punctures medially, lateral punctures close but more rounded, area adjacent to each lateral ocellus polished and impunctate; scutum with a narrow, median area posteriorly where the surface is shining and sparsely punctate, punctures otherwise quite uniformly close on scutum, scutellum and pleura; sterna 7 and 8 and genital armature similar to *variabilis* (fig. 134).

DISTRIBUTION—Although widespread in Canada and the Northern United States, this species has been rare in collections received for study. Specimens have been identified only from New Brunswick and New York, May to August.

HOST — Plath (1934), quoting Sladen, gives *Bombus flavifrons* as the host of *insularis*. Since the ranges of these two species do not entirely coincide, it seems evident that it will select some other species of *Bombus* as well.

Psithyrus variabilis (Cresson)

(Fig. 134)

Apathus variabilis Cresson, 1872. Amer. Ent. Soc. Trans. 4, p. 284. ♀ ♂.

Psithyrus variabilis Robertson, 1929. Flowers and Insects, Lancaster, Pa., Science Press. (flower records)

FEMALE—Length 17.5-19 mm., breadth of abdomen 8.5-9 mm.; black, including tarsi and spurs, the tegulae reddish-piceous; wings deeply infuscated, veins testaceous to black; pubescence quite short in general, largely black on head, with median area of vertex yellow pubescent with a few black hairs intermixed; anterior third of scutum and area around tubercles with dense but rather short, copious, yellow pubescence, and scutellum densely yellow pubescent across posterior margin, the scutum posteriorly relatively bare medially but otherwise with short, black pubescence, continuing sparsely onto scutellum medially; pleura, propodeum and legs largely black pubescent, only the apical tarsal segments with some short, pale pubescence evident, hairs on the legs very short; abdominal terga entirely black pubescent, hairs very short, no more than one-fourth the length of the terga; clypeus finely and densely punctate across upper margin, becoming deeply and rather coarsely punctate on each side below, the median apical area shining and sparsely, minutely punctate; labrum with a flattened, basal tubercle on each side, separated by a deep and narrow depressed area, apical margin rounded, quite abruptly depressed; apical margin of mandible with a very minute, median notch, outer face shining, very sparsely and minutely punctate; malar space shining, very minutely but rather closely punctate, median length about two-thirds basal width of mandible, one-fourth length of eye; face closely and finely punctate from clypeal margin to ocelli, becoming shining and sparsely punctate between ocelli and eyes, vertex minutely and closely punctate medially, becoming shining, finely and sparsely punctate laterally; lateral

ocelli subequally distant from eyes and each other, space between ocelli and margin of vertex fully twice as great; scape slightly more than half the length of the flagellum, segments 1 and 3 of flagellum about equal, somewhat longer than segment 2 which is broader than long; sternum 6 subtriangular, not protuberant, the disc medially somewhat shining, lateral margins only very slightly elevated.

MALE—Length 14.5-17 mm., breadth of abdomen 6-7 mm.; black, apical tarsal segments becoming somewhat more brownish-testaceous, the more basal leg segments somewhat reddish, spurs testaceous and tegulae reddish-piceous; wings deeply infuscated, veins testaceous to blackish; vertex with copious and rather elongate yellowish pubescence medially, pubescence of head otherwise largely black, rather short and dense; scutum anteriorly and area around tubercles with rather copious, elongate, yellow pubescence, the scutellum fringed with long yellow pubescence posteriorly, scutum posteriorly and scutellum medially with rather short, black pubescence, and pleura and propodeum largely black; legs blackish or fuscous pubescent in large part, more elongate on the more basal segments, short on tibiae and tarsi except for a posterior dark fringe on front tibiae, apical tarsal segments with very short pale pubescence; pubescence of abdominal terga quite short, the individual hairs no longer than half the median length of the plates, largely black but with varying amounts of yellow on the more median terga laterally, terga 3 and 4 sometimes largely yellow; clypeus dull, very finely and closely punctate; labrum somewhat more shining, punctures minute and rather vague, apical margin slightly depressed, broadly truncate; mandibles quite short and slender, distinctly bidentate apically, outer face densely covered with short, yellowish pubescence and fringed below with elongate, somewhat curved, dark hairs; malar space smooth and shining, somewhat shorter than basal width of mandible, about one-fourth length of eye; face very finely and closely punctate from clypeus to area just below ocelli, surface shining and sparsely punctate between eyes and ocelli; vertex closely and finely punctate medially but becoming somewhat more distinctly separated laterally; lateral ocelli subequally distant from eyes and each other, much more widely removed from margin of vertex; basal segment of flagellum only very slightly shorter than segment 2, segment 3 much longer; sterna 7 and 8 and genital armature as shown (fig. 134).

DISTRIBUTION—Illinois and Ohio, to North Carolina and Florida, west to the Dakotas and Mexico, June to November, with earlier records in Florida.

FLOWER RECORDS—*Amorpha, Asclepias, Aster, Bidens, Blephilia, Brauneria, Cephalanthus, Cirsium, Eupatorium, Geranium, Helianthus, Hydrophyllum, Lycopus, Melilotus, Petalostemum, Phlox, Polemonium, Polygonum, Pycnanthemum, Rubus, Rudbeckia, Solidago, Teucrium, Trifolium, Verbena* and *Vernonia* are listed by Robertson, (1929).

Apis Linnaeus

(Fig. 128)

Apis Linnaeus, 1758. Syst. Nat. 10th ed., p. 343. Type: *(Apis mellifica* Linnaeus) = *Apis mellifera* Linnaeus. Desig. by Latreille, 1810.

Apiarus Rafinesque, 1815. Analyse Nature ou Tabl. Univers, p. 123. Proposed unnecessarily to replace *Apis*.

Megapis Ashmead, 1904. Ent. Soc. Wash. Proc. 6, p. 120. Type: *Apis dorsata* Fabricius. Orig. Desig.

Micrapis Ashmead, 1904. Ent. Soc. Wash. Proc. 6, p. 122. Type: *Apis florea* Fabricius. Monob. and orig. desig.

Systematics of the Apinini, Maa, 1953. Treubia 21, pp. 525-640. (classification)

Apis is an Old World genus, and none of the species is native to the Americas. Of the four included species, only the domesticated honey bee, *Apis mellifera*, has been introduced into North America, but it is widespread throughout the continent.

In contrast with the bumblebees, the species of *Apis* are perennially social, colonies persisting over the winter from one season to the next for periods of three or four years. Moreover, these is no intergradation in size or structure between the queen and the worker caste, and queens never engage in foraging activities or nest building. Queens and workers are genetically similar, the development of a fertilized egg into one or the other dependent upon the size of the cell and the character of the food supplied the larva by the workers. Males or drones, of course, result from unfertilized eggs, as in most other Hymenoptera, but they also require larger cells for the development of the larva.

In *Apis* the hind tibial spurs are absent, the jugal lobe of the hind wing is present, and the marginal cell of the front wing is

narrow and elongate, its tip approaching the apex of the wing. The head is characterized by the densely hairy eyes, while the labrum is transverse, broad and very short.

Apis mellifera Linnaeus

Apis mellifera Linnaeus, 1758. Syst. Nat. Ed. 10, p. 576.
Apis mellifica Linnaeus, 1761. Fauna Suecica, Ed. 2, p. 421. Proposed to replace *mellifera*.
Apis mellifica var. *Ligustica* Spinola, 1806. Insectorum Liguriae 1, p. 35.
Apis mellifica var. *remipes* Gerstaecker, 1862. Geog. Verbr. d. Honigbiene, p. 61.
Apis mellifera Dalla Torre, 1896. Catalogus Hymenopterorum 10, p. 595-610 (bibliography)
Apis mellifera Michener, 1953. Kans. Univ. Sci. Bul. 35, p. 1094. (larva)
The Behavior and Social Life of Honeybees, Ribbands, 1953. Bee Research Assoc., pp. 1-352. (biology)
The World of the Honeybee, Butler, 1954. London, Collins, pp. 1-226. (biology)
The Dancing Bees, von Frisch, 1955. New York, Harcourt, Brace & Co., pp. 1-183. (physiology)
Anatomy of the Honey Bee, Snodgrass, 1956. Ithaca, N. Y., Comstock Publishing Associates, pp. 1-334. (morphology)
Communication Among Social Bees, Lindauer, 1961. Harvard Univ. Press, pp. 1-143. (biology)

Probably there is a more voluminous literature devoted to the honey bee than to any other insect. In Volume 10 of Dalla Torre's Catalog of Hymenoptera, for example, the list of references covers 15 pages and numbers about 750. Moreover it seems likely that the number of articles concerning it which have appeared annually during the 65 years since this catalog is greater than during the earlier period. Therefore the bibliography above includes only those references having significance with respect to the name used, and some of the more recent general works concerning the morphology, physiology and biology of this insect. The two varieties listed refer to subspecies or races, the Italian bee *(Ligustica)* and the Caucasian bee *(remipes)*, which have been introduced into the New World along with typical *mellifera*, the German bee. These have interbred on this continent to the degree that it is practically impossible to find typical representatives of any of the three forms.

In the following descriptions the worker caste is stressed, for it is the form usually collected along with wild bees of other species during its visits to flowers. The queen is rarely seen by other than beekeepers and does not visit flowers. Drones (males) also are more conveniently collected in the vicinity of bee hives than on visits to flowering plants.

WORKER—Length 12 mm.; head and thorax piceous, abdomen more or less testaceous anteriorly, becoming piceous posteriorly, legs brownish-testaceous to piceous, front and middle spurs yellowish, hind spurs absent; wings subhyaline, veins pale yellow, but costa more piceous; clypeus rather flat; labrum short, transverse, margin slightly curved; mandibles somewhat constricted medially, broadened apically, apical margin forming a smooth, non-dentate edge; malar space considerably longer than basal width of mandible; cheeks slightly broader than eyes; lateral ocelli only very slightly removed from margin of vertex; eyes well covered with erect but rather short hairs; basal segment of flagellum about equal to segment 3, segment 2 much shorter; mid basitarsus broad and flat, fully as long and broad as the tibia; hind basitarsus also broad and flat, fully as broad as apex of tibia but considerably shorter; hind tibiae with well developed corbiculae; body surface generally quite smooth, punctures exceedingly minute and obscure where evident; pubescence copious on head and thorax, pale yellowish, becoming more or less fuscous on vertex and scutum, short and suberect on abdominal terga, yellowish, becoming fuscous on the more apical segments.

QUEEN—Length 16-20 mm.; head almost circular in frontal view; mandible with an acute apical tooth separated from a broader cutting edge by a distinct indentation; mid basitarsus flattened but distinctly shorter and narrower than the tibia; hind basitarsus broad and flat, nearly as broad as the tibia; outer surface of hind tibiae more convex, finely pubescent, and thus lacking the corbiculae; color, pubescence and puncturation similar to worker.

DRONE (MALE)—Length 15-16 mm.; eyes extremely large, occupying most of lateral and upper surface of head, meeting at mid-line above, ocelli located near mid transverse line of face, lateral pair adjacent to inner margin of eye; clypeus and front of face much restricted, pubescence short and dense; mandibles very small, with a fine apical tooth and a longer upper edge; malar space very short; segments 1 and 2 of flagellum very short, ringlike, following segments elongate; front and

middle basitarsi slender, shorter and much narrower than their respective tibiae; hind basitarsi fully as broad as apex of their tibiae, outer surface strongly convex, tibiae slender at base, strongly dilated apically; color and puncturation about as in worker; pubescence entirely pale yellowish, dense but rather short on face and over most of thorax, more elongate and entirely pale on abdomen basally and apically; genital armature largely membraneous, with only a pair of penis valves that are sclerotized, and with two pairs of more lateral valves possibly representing the gonocoxites and gonostyli.

DISTRIBUTION—World wide, throughout the season.

Table 18—Distribution of species of *Bombus*, *Psithyrus* and *Apis* by states.

	New England						North Central						Mid Atlantic								South-eastern						
Bombus	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	Wisconsin	Michigan	Illinois	Indiana	Ohio	Kentucky	New York	New Jersey	Pennsylvania	Maryland	Delaware	West Virginia	Virginia	Dist. Columbia	Tennessee	North Carolina	South Carolina	Mississippi	Alabama	Georgia	Florida
affinis			X	X	X			X			X							X	X			X					
bimaculatus	X			X	X			X	X		X		X	X		X		X	X	X	X	X		X		X	X
borealis								X					X														
fervidus	X		X	X	X	X		X		X	X		X	X	X			X				X		X		X	
fraternus								X	X											X		X		X		X	X
griseocollis	X			X	X			X	X	X	X		X	X		X						X				X	X
impatiens	X			X	X			X	X	X	X		X	X	X			X	X	X	X	X		X		X	X
nevadensis									X																		
n. auricomus								X	X				X	X							X	X				X	
pennsylvanicus			X	X	X			X	X		X	X	X	X	X			X	X		X	X		X	X	X	X
perplexus	X		X		X			X			X			X		X		X	X		X	X				X	
rufocinctus	X							X																			
sandersoni				X									X		X			X			X	X					
ternarius	X		X	X				X					X		X				X							X	
terricola	X		X	X	X			X					X	X								X			X	X	X
vagans	X	X	X	X	X			X	X		X		X	X	X	X		X	X		X	X				X	
Psithyrus																											
ashtoni	X			X				X			X		X														
citrinus	X	X		X	X	X		X	X		X		X	X				X	X		X	X			X	X	
fernaldae	X			X									X								X	X					
insularis													X														
variabilis									X		X											X			X	X	X
Apis																											
mellifera	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Appendix to Part I

Since the publication of Part 1 of this work a number of errors have been discovered which are in need of correction, and the true identity of one uncertain species has been determined.

Andrena aliena Smith was retained in that genus and was described on p. 256, but doubt was expressed as to the correctness of this generic assignment. Upon learning that C. D. Michener planned to visit the British Museum to study the types of Australian bees, his attention was called to this problem, and his examination of the specimen indicated that it is a species of *Leioproctus,* near *Paracolletes,* in the Australian fauna. The specimen evidently was mislabelled, and this species can now be deleted from the list of North American *Andrena.*

On page 232 *Andrena clypeonitens* Graenicher ♂, was incorrectly indicated to be a synonym of *A. integra* Smith. The female of *clypeonitens* was described by Cockerell, in 1902, and is correctly shown to be a synonym of *A. chromotricha* Cockerell on page 172. The male described by Graenicher was *integra,* not *chromotricha,* hence that reference should be indicated as as misidentification.

On page 349 *Halictus arcuatus gulosus* Cockerell, 1911, should have been included as a new synonym of *Evylaeus arcuatus* (Robertson). For the complete reference add: Ann. Mag. Nat. Hist. (8), 8, p. 661. ♀. New synonymy.

The following reference was erroneously omitted from the synonymy of *Dialictus pilosus pilosus* (p. 413): *Halictus floridanus caesareus* Cockerell, 1916. Brooklyn Ent. Soc. Bul. 11, p. 11. ♀.

It has been suggested by van der Vecht in Leiden (Ent. Ber. 19, p. 69, 1959) that *Apis sericea* Forster may be the same as *Agapostemon virescens* (Fabricius) 1775 (p. 455). If this is the fact, and the brief description of *sericea* would seem to support it, application of the law of priority would result in reducing *virescens* to synonymy. Forster's description of *sericea* was published in 1771 in a paper entitled "Novae Species Insectorum, Centaurea I," along with nine other aculeate Hymenoptera.

Several errors in the association of the sexes in species of *Evylaeus* and *Dialictus* have been discovered by Gerd Knerer while engaged in graduate studies at the University of Toronto. Collection of both sexes at nesting sites and data on distribution indicate that the male attributed to *arcuatus* (p. 339) should be assigned to *truncatus* (p. 361). Atwood described *arcuatus* (1934, Canad. Jour. Res. 10, p. 205) from good series of both sexes which were collected considerably north of the known range of *truncatus.* Moreover, his description of the males agrees with *cinctipes* Provancher, and not to that of *arcuatus* ♂ of Robertson. Recently specimens of both sexes were received from Atwood and Knerer and the males are similar in all essential details with a homotype specimen of *cinctipes* which has been compared with the type in Quebec. Thus *arcuatus* ♀ becomes a synonym and the missing sex of *cinctipes,* and *arcuatus* ♂ is a synonym of *truncatus.* This leaves the male described as *truncatus* (p. 361) unassigned to any female and unnamed. This series of males has been sent to Knerer, and it is hoped that he will suggest a name if it cannot be related to any known female.

In *Dialictus* Knerer has collected both sexes of *viridatus* Lovell at nesting sites, but the males agree with *lepidus* Mitchell (p. 438) rather than with the males attributed to this species by Lovell (p. 430). A new name will be needed for these males if they cannot be associated with any known females. Likewise Knerer has found both sexes of *laevissimus* (Smith) and *rohweri* (Ellis) in abundance at their respective nesting areas, leaving no doubt concerning the sex associations. He has found that the males assigned to *laevissimus* (p. 402) should have been placed with *rohweri* (p. 418). The true males of *laevissimus* apparently have not been described. One other association of sexes also is now possible through Knerer's work, for he has collected both sexes of *pictus* (Crawford) at the nesting site. These males agree with *muskegonensis* Mitchell (p. 439) which therefore becomes a synonym of *pictus* (p. 412).

No names are being suggested for these misidentified sexes, nor are any new species of the genera included in Part 1, dis-

covered since its publication, being described. It is believed that these should be left to other students who may undertake revisional or biological studies of limited groups. The extent of certain of the genera is such that a high degree of concentration is required to attain the thorough familiarity with the included species that is desirable. The limitations of a faunal study were pointed out in the Introduction (p. 8, under Objectives). It was realized from the start that the data on the more extensive genera is far from complete, but it was believed that a general faunal study would be useful and would serve as a starting point for future workers in the area covered.

Tables of Distribution

Page

1. Lithurgus, Anthidium, Dianthidium, Parathidium, Anthidiellum and Heteranthidium 32

2. Stelis and Heterostelis 48

3. Prochelostoma, Heriades, Ashmeadiella and Hoplitis 68

4. Osmia (Osmia, Acanthosmioides, Cephalosmia, Centrosmia, Monilosmia, Diceratosmia, Chalcosmia, Nothosmia and Chenosmia) 103

5. Megachile (Megachile, Litomegachile, Eutricharaea, Delomegachile, Megachiloides and Xeromegachile) 155

6. M. (Phaenosarus, Xanthosarus, Argyropile, Leptorachis, Acentron, Pseudocentron, Melanosarus, Sayapis, Archimegachile and Chelostomoides) 191

7. Coelioxys 230

8. Exomalopsis, Ptilothrix, Melitoma, Peponapis, Xenoglossa, Cemolobus, Anthedonia, Florilegus and Svastra 263

9. Melissodes (Melissodes, Heliomelissodes, Apomelissodes, Callimelissodes and Eumelissodes) 310

10. Xenoglossodes, Tetralonia, Anthophora, Emphoropsis and Centris 337

11. Nomada (Gnathias, Micronomada, Holonomada, Centrias and Nomadula) 372

12. Nomada (Callinomada, Phor, Pachynomada and Heminomada) 401

13. Nomada (Nomada) 437

14. Epeolus 458

15. Triepeolus 485

16. Holcopasites, Neolarra, Epeoloides, Melecta, Xeromelecta and Ericrocis 499

17. Ceratina and Xylocopa 512

18. Bombus, Psithyrus and Apis 546

INDEX

Valid names are in roman type, synonyms in italics, genera are capitalized, subgenera are in parentheses, and subspecies are indicated by (s).

A

Abda 251
abrupta Say, Anthophora 324
(Acanthosmioides) Osmia 69, 73
(Acentron), Megachile 108, 165-166
Aceratosmia 69
acuta Sm., Megachile 157
addenda Cress., Megachile 131
aegis LaBerge, Svastra 256
aenea L., Osmia 85
affabilis Cress., Nomada 361
affinis Cress., Bombus 518
agilis Cress., Melissodes 282
alachuensis Mitch., Triepeolus 462
albata (Cress.), Xenoglossodes 311
albifrons (Kby), Hoplitis 58
albitarsis Cress., Megachile 165
albiventris Cress., Osmia 88
albofasciata Sm., Nomada 346
albohirta Mitch., Osmia 94
albula Lov. & Ckll., Megachile 135
(Alcidamea) Hoplitis 56, 61-64
Alfkenella 323
aliena Sm., Andrena 547
Alpigenobombus 513
alternata Say, Coelioxys 195
altilis Cress., Coelioxys 215
ambigua Sm., Melissodes 300
Amblys 69
americanorum Fabr., Bombus 524
(Amegilla), Anthophora 323, 330
americana Kby, Nomada 365
(Andronicus) Hoplitis 56, 59
annulata Sm., Nomada 380
Anthedon 251
Anthedonia 251-253
Anthemoëssa 323
Anthemois 108
Anthidiellum 18-22
Anthidium 9-12
Anthophora 323-331
ANTHOPHORIDAE 233-499
(Anthophorisca), Exomalopsis 236-238
Anthophoroides 323
Apathus 538
Apiarus 544
apicalis Spin., Megachile 120
apicata Lov. & Ckll., Melissodes 276
APIDAE 513-546
Apis 544-546
appalachensis (s) Mitch., Megachile 134
aquilarum Ckll., Nomada 372
(Archimegachile), Megachile 108, 181-182
ardens Sm., Centris 335
arenicola (s) Cwfd., Coelioxys 224
argentifrons (s) (Cress.), Hoplitis 59
(Arogochila) Ashmeadiella 53
(Argyropile), Megachile 108, 159-163
Argyroselenis 438
armatella Ckll., Nomada 402
articulata Rob., Nomada 411
articulata Sm., Nomada 365
aschenborniana Ckll., Melissodes 273
Ashmeadiella 53-56
ashtoni (Cress.), Psithyrus 539
Ashtonipsithyrus 438
aspera Mitch., Megachile 129
assimilis Sm., Melissodes 300
asteris Ckll., Heriades 51
asteris Cwfd., Coelioxys 196
asteris Mitch., Exomalopsis 236
asteris Rob., Melissodes 300
astragali (s), Ckll., Bombus 529
ater Mitch., Stelis 39
atlantica (s) Lins., Melecta 492
atlantica Mitch., Coelioxys 198
atlanticus (s) Mitch., Triepeolus 479
atrifrons Ckll., Svastra 259
atrimitra (s) LaBerge, Svastra 259
atripes (Cress.), Svastra 257
atripes (s) Mitch., Triepeolus 474
atriventris Cress., Osmia 95
atriventris (Sm.), Tetralonia 313
audax Mitch., Megachile 140
augustiana Mitch., Nomada 402
aurescens Ckll., Melissodes 273
auricomus (s) (Rob.), Bombus 520
aurigenia Cress., Melissodes 282
australis (Cress.), Heterostelis 33
australis Mitch., Epeolus 441
australis Mitch., Nomada 367
Autochelostoma 56
autumnalis Mitch., Nomada 382
autumnalis Rob., Epeolus 442
autumnalis Rob., Melissodes 289
avara Cress., Megachile 134
azaleae Mitch., Nomada 403

B

bahamensis Mitch., Megachile 169
banksi (Ckll.), Epeolus 442
banksi Ckll., Nomada 404
banksi Cwfd., Coelioxys 213
barbatus Rob., Heriades 51
belfragei (Cress.), Tetralonia 315
bella Cress., Nomada 346
bermudensis Mitch., Megachile 167
bethunei Ckll., Nomada 382
bidentata Prov., Anthophora 328
bidentis Ckll., Melissodes 283
bifasciatus Cress., Epeolus 443
bilineatum (s) Schw., Anthidium 11
bilobata Swenk, Nomada 265, 426
bimaculata (Lep.), Melissodes 267
bimaculatus Cress., Bombus 531
binotata Say, Melissodes 267
binotatus (s) Rob., Nomada 351
birkmanni Ckll., Stelis 40
bishoppi Ckll., Megachile 161
bishoppi Ckll., Nomada 383
blakei Ckll., Melissodes 295
boharti Mitch., Coelioxys 206
boltoniae Rob., Melissodes 284
Bombias 513
bombiformis (Cress.), Ptilothrix 240
bomboides Kby, Anthophora 325

Bombomelecta 492
Bombus 513-538
boreale (s) (Rob.), Anthidiellum 20
borealis Cress., Hoplitis 58
borealis Kby., Bombus 522
(Brachymelissodes), Svastra 255
Bremus 513
brevis Cress., Coelioxys 215
brevis, Say, Megachile 114
brimleyi Mitch., Megachile 143
bruesi Ckll., Melissodes 273
bruesi Mitch., Lithurgus 8
bucephala Cress., Osmia 76
bucephala Sm., Megachile 179
buconnis (Say), Ashmeadiella 54

C

caesareus (s) Ckll., Dialictus 547
calcarata Rob., Ceratina 502
caliginosa (s) (Cress.), Svastra 261
calliopsidis (Lins.), Holcopasites 486
californica (Cress.), Xeromelecta 494
(Callinomada), Nomada 338, 372-377
campanulae (Rob.), Megachile 182
canadensis Cress., Anthophora 325
canadensis Cress., Osmia 79
canadensis Friese, Megachile 138
canadensis Mitch., Epeolus 444
canadensis Rob., Osmia 90
canadensis Slad., Hoplitis 62
capillata Mitch., Nomada 406
capitalis Mitch., Nomada 385
carinata Cress., Heriades 49
carolina Fab., Xylocopa 510
carolinae Ckll., Nomada 351
carolinensis Brimley, Svastra 259
carolinus Mitch., Epeolus 445
castoris (s) Ckll., Bombus 529
ceanothi Ckll., Nomada 406
Cemolobus 249-251
(Centrias), Nomada 338, 364-365
Centris 333-337
Centrosmia (Osmia) 69, 76-78
centuncularis (L), Megachile 124
cephalica Prov., Megachile 179
(Cephalosmia) Osmia 69, 75
Cephen 338
Ceraplastes 35
Ceratias 108
Ceratina 500-507
(Ceratinula), Ceratina 501
Ceratosmia 69
Ceri-anthidium 18
cevalliae Ckll., Bombus 524
(Chalcosmia) Osmia 69, 84-88
chalybea Sm., Osmia 84
charlottensis Mitch., Triepeolus 462
(Chelostomoides), Megachile 108, 182-190
(Chelynia) Stelis 35, 40
(Chenosmia) Osmia 69, 95-102
chippewaense Graen., Heteranthidium 29, 30
chlorops Ckll., Osmia 79
(Chlorosmia) Hoplitis 56
cinctipes (Prov.), Evylaeus 547
cirsianus Mitch., Triepeolus 463
citrinus (Sm.), Psithyrus 540
Clavicera 500
(Clisodon), Anthophora 323, 328
clypeata (Slad.), Hoplitis 57
clypeonitens Graen., Andrena 547
cnici Rob., Melissodes 274
cockerelli (Cwfd.), Neolarra 490
Cockerelli Fox, Centris 334
cockerelli H.S.Sm., Ceratina 501
cockerelli Titus, Heteranthidium 29
coctus (s) Bequaert & Plath 537
Coelioxys 192-232
coerulescens (L.), Osmia 85
cognata Cress., Osmia 79
cognatum Cress., Anthidium 10
collinsiae Rob., Osmia 96
coloradella Ckll., Osmia 89
coloradensis Cress., Melissodes 280
colorata Mitch., Nomada 386
communis Cress., Melissodes 269
composita Mitch., Nomada 408
compressus Sm., Lithurgus 7
compta (Cress.), Anthedonia 252
comptoides Rob., Melissodes 271
comstockii Cress., Coelioxys 200
concavus (Cress.), Triepeolus 464
concinna Sm., Megachile 121
concolor (s) (Rob.), Triepeolus 472
condignus (Cress.), Florilegus 253
confusa Rob., Melissodes 286
confusiformis Ckll., Melissodes 286
conjuncta (Cress.), Osmia 81
conjunctoides Rob., Osmia 83
consimilis Cress., Bombus 537
consultus Frank., Psithyrus 542
contiguus Cress., Psithyrus 540
coquilletti Ckll., Triepeolus 465
cordata Rob., Osmia 89
coreopsana Mitch., Megachile 146
coreopsis Rob., Melissodes 286
cornelliana Ckll., Nomada 352
corticalis Gerst., Osmia 77
costalis Cress., Stelis 37
crassipes (Cress.), Heteranthidium 24
crassula Ckll., Nomada 354
crataegina Ckll., Hoplitis 65
crawfordi Graen., Heriades 50
cressoni (s) Ckll., Bombus 521
cressoni D.T., Coelioxys 215
cressoni D.T., Osmia 81
(Cressoniella), Megachile 108
cressonii Rob., Nomada 409
cressonii (Rob.), Triepeolus 466
crudelis Cress., Nomada 410
Ctenosmia 56
cucurbitarum Ckll., Xenoglossa 248
(Cullumanobombus), Bombus 513
cuneata (Rob.), Nomada 347
curvatum (Sm.), Dianthidium 15
cyanea Gir., Osmia 85
(Cyanocentris), Centris 333
cylindrica (Cress.), Hoplitis 59
Cyphopyga 108

D

dacotana Ckll., Nomada 365
dakotensis Mitch., Megachile 145
daponsa Bridwell, Melissodes 274
davidsoniella Ckll., Osmia 87
deayi (s) Chandler, Bombus 532
decemnotatus (s) Rob., Nomada 347
decepta Mitch., Nomada 411
decipiens Lov. & Ckll., Megachile 126

deflexa Cress., Megachile 146
(Delomegachile), Megachile 108, 131-141
dentariae (Rob.), Nomada 386
denticulata (s) Cress., Ashmeadiella 55
denticulata Rob., Nomada 411
denticulata Sm., Melissodes 288
dentiventris Sm., Melissodes 289
depressa Cress., Nomada 413
depressicauda Ckll., Nomada 413
derelictula Ckll., Megachile 122
(Derotropis), Megachile 108
desponsa Sm., Melissodes 274
detrita Mitch., Nomada 414
Diadasiella 235
Dianthidium 15-18
(Diceratosmia) Osmia 69, 81-84
dilecta Cress., Tetralonia 321
dimidiati-ventris Dours, Megachile 120
disparilis Cress., Megachile 179
distincta Cress., Osmia 90
distinctus (Cress.), Triepeolus 467
diversicolor Cwfd., Stelis 39
dolichos Fox, Coelioxys 200
donatus (Sm.), Triepeolus 467
dorsale (Lep.), Heteranthidium 26
dorsalis Prov., Bombus 533
dreisbachi Mitch., Nomada 414
dubitata (Cress.), Tetralonia 316
dubitata Sm., Coelioxys 220
dupla Say, Ceratina 503

E

electa Cress., Nomada 388
electella Ckll., Nomada 389
emoryi Ckll., Megachile 156
Emphor 240
Emphoropsis 331-333
Energoponus 240
Entechnia 242
Epeoloides 490-492
Epeolus 438-458
(Epimelissodes), Svastra 255-262
Epimonispractor 235
Ericrocis 497-498
erigeronis Mitch., Epeolus 445
erigeronis Rob., Nomada 364
errans Fox, Centris 335
Eusynhalonia 312
(Eutricharaea), Megachile 108, 120-124
exclamans Vier., Megachile 129
Exomalopsis 235-240
(Exomalopsis), Exomalopsis 238-240
expallidus (s) Ckll., Bombus 536

F

faceta Cress., Osmia 87
felti Ckll., Osmia 78
femorata Sm., Megachile 157
fernaldae Frank., Psithyrus 541
Fernaldaepsithyrus 538
fervida Sm., Nomada 354
Fervidobombus 513
fervidus (Fabr.), Bombus 523
festinata Prov., Melissodes 300
festiva Cress., Nomada 390
figginsi Ckll., Osmia 89
fimbriata Cress., Melissodes 277
floridana Cress., Coelioxys 202
floridana (s) Graen., Stelis 38
floridana (s) Mitch., Ceratina 505
floridana (Rob.), Ashmeadiella 55
floridana Rob., Megachile 167
floridana Sm., Emphoropsis 332
floridanus Mitch., Triepeolus 468
floridensis Mitch., Epeolus 446
floridensis (s) Mitch., Heterostelis 33
floridensis Mitch., Megachile 169
floridiense Schw., Dianthidium 16
florilega Lov. & Ckll., Nomada 415
Florilegus 253-255
florissanticola Ckll., Osmia 74
foederalis Sm., Stelis 45
fontemvitae Schw., Heteranthidium 27
(Formicapis) Hoplitis 56, 57
fortis Cress., Megachile 156
fragariae Mitch., Nomada 391
frater (Cress.), Tetralonia 317
Fraternobombus 513
fraternus (Sm.), Bombus 526
frigida Sm., Megachile 133
frigida Sm., Osmia 77
frugalis Cress., Megachile 173
fulvohirta (Cress.), Tetralonia 318
fumosa LaBerge, Melissodes 291
funerarea Sm., Coelioxys 203
furcata (Panz), Anthophora 330
fuscojubatus Ckll., Ptilothrix 240

G

galactiae Mitch., Coelioxys 204
galvestonensis Ckll., Melissodes 273
gemula Cress., Megachile 134
generosa Cress., Megachile 118
georgica Cress., Megachile 186
georgica Cress., Osmia 86
georgica (s) (Cress.), Svastra 259
georgicus Mitch., Triepeolus 469
germana Cress., Coelioxys 207
gibbosus Sm., Lithurgus 7
glabratus Cress., Epeolus 447
gleasoni Titus, Hoplitis 65
globosa Cress., Osmia 98
globosiformis Ckll., Osmia 98
glomerans Schlett. Heriades 49
(Gnathias), Nomada 338, 346-353
Gnathocera 108
Gnathodon 108
Gnathosmia 69
graceae Ckll., Hoplitis 61
gracilis Cress., Nomada 416
graenicheri Ckll., Nomada 391
grandis Cress., Megachile 176
grindeliarum Ckll., Megachile 159
griseocollis Deg., Bombus 527
grossa Mitch., Heterostelis 35
gulosus (s) Ckll., Evylaeus 547
Gundlachia 333
Gymnus 35
Gyrodroma 35

H

halophila (s) Ckll., Ceratina 503
hamata Bradley, Tetralonia 319
harbecki Cwfd., Heteranthidium 26
heiligbrodtii Cress., Nomada 355
helenae Ckll., Hoplitis 62

helenae (s) Frison, Bombus 537
helianthi (Rob.), Triepeolus 470
helianthophila Ckll., Melissodes 286
heliopsis (Rob.), Holcopasites 487
(Heminomada), Nomada 338, 380-400
Hemisia 333
Heriades 48-52
hesperella Ckll., Osmia 89
Heteranthidium 23-31
Heterocentris 333
heterodonta Ckll., Megachile 176
Heterostelis 33-35
hicksi Ckll., Hoplitis 59
hitei Ckll., Melissodes 271
Holcopasites 486-490
(Holonomada), Nomada 338, 361-364
honesta Cress., Tetralonia 315
Hoplitella 56
(Hoplitina) Hoplitis 56
Hoplitis 56-67
hortivagans Ckll., Melissodes 269
howardi Mitch., Epeolus 447
hudsonica Cress., Osmia 77
hudsonicus Cress., Bombus 533
hunteri Cwfd., Coelioxys 209
hydrophylli Swenk, Nomada 348

I

ilicis Mitch., Epeolus 448
illata Lov. & Ckll., Melissodes 292
illinoensis Rob., Nomada 417
illinoensis Rob., Osmia 97
illinoensis Rob., Svastra 261
illinoensis (Rob.), Tetralonia 321
illinoiensis (Rob.), Holcopasites 488
imbecilla Gerst., Megachile 122
imbricata Sm., Nomada 392
immaculata Ckll., Coelioxys 210
impatiens Cress., Bombus 532
improbus Cress., Bombus 521
incerta Cress., Nomada 365
incondita Ckll., Melissodes 306
indianorum Ckll., Megachile 146
indusata Mitch., Nomada 418
inepta Mitch., Nomada 419
inermis Prov., Megachile 126
inermis (Zett.), Osmia 98
infantula Ckll., Nomada 425
infragilis Cress., Megachile 124
ingenua Cress., Megachile 137
inimica Cress., Megachile 174
inspergens Lov. & Ckll., Osmia 91
insularis Sm., Psithyrus 542
integer Rob., Nomada 377
integerrima D.T., Nomada 377
integra Cress., Megachile 148
integra Rob., Nomada 377
integra Cress., Osmia 73
integrella Mitch., Megachile 150
interrupta (Cress.), Xeromelecta 496
interruptus Greene, Psithyrus 542
interruptus Rob., Epeolus 449
ipomoeae (Rob.), Cemolobus 250

J

jugatoria Say, Paranthidium 13
jugatorium (Say), Paranthidium 13
junctus Mitch., Triepeolus 471

K

kallstraemiae Ckll., Megachile 165
kansensis Ckll., Xenoglossa 247
kincaidii Ckll., Coelioxys 226
kingstonensis Mitch., Nomada 420
krombeini (s) Hurd, Xylocopa 511

L

labiata (Prov.), Stelis 40
laboriosa (Fab.), Emphoropsis 332
laboriosus Frison, Psithyrus 540
laevissimus (Sm.), Dialictus 547
(Laminomada), Nomada 338
lanata (Fabr.), Megachile 181
languinosa Sm., Megachile 114
lanhami Mitch., Epeolus 450
lanosa Cress., Centris 334
Lasius 323
lata (Cress.), Ericrocis 497
lateralis Cress., Coelioxys 203
lateralis Cress., Stelis 42
latimanus Say, Megachile 157
latitarsis Cress., Osmia 76
lavata Ckll., Melissodes 295
leavitti Cwfd., Heriades 50
lectoides Rob., Epeolus 451
lehighensis Ckll., Nomada 420
leoni Titus, Megachile 124
lepida Cress., Nomada 347
lepidum (s) (Cress.), Paranthidium 15
(Leptorachis), Megachile 108, 163-165
(Leucobombus), Bombus 513
Leucosmia 69
lignaria Say, Osmia 72
lignicola Prov., Osmia 76
lignivora Pack., Osmia 76
Ligustica (s) Spin., Apis 545
(Liothyrapis), Coelioxys 192
Lithurge 6
(Lithurgopsis) Lithurgus 6
Lithurgus 6-9
(Litomegachile), Megachile 108, 114-120
loena Ckll., Melissodes 273
louisae Ckll., Stelis 37
louisianae Ckll., Nomada 349
louisianae Ckll., Osmia 86
lucrosa Cress., Coelioxys 203
lucrosa Cress., Megachile 179
lunata Sm., Ceratina 501
lunatus (Say), Triepeolus 472
luteola Oliv., Nomada 393
luteoloides Rob., Nomada 398
lutzi (s) Ckll., Peponapis 244
lyncis Ckll., Osmia 75

M

maculifrons Sm., Anthidium 9
maculata Cress., Nomada 350
major Rob., Osmia .....79 & 96
mandibularis Cress., Osmia 87
Macrocera 312
manipularis Sm., Melissodes 294
manni Ckll., Melissodes 269
manumuskin Vier., Megachile 131
Martindalei Fox, Megachile 181
Martini Ckll., Melissodes 269
masuca Ckll., Melissodes 273
maura (s) (Cress.), Hoplitis 59

(Mecanthidium) Paranthidium 13
media Mitch., Nomada 421
(Megabombus), Bombus 513
megacephala Cress., Osmia 76
megacerata Ckll., Melissodes 289
Megachile 108-191
(Megachile), Megachile 108, 124-130
MEGACHILIDAE 5-232
(Megachiloides), Megachile 108, 141-143
Megalochila 108
megagyna Ckll., Megachile 146
Megapis 544
melandri Ckll., Melissodes 284
melanophoea Sm., Megachile 138
melanopoda Vier, Coelioxys 220
(Melanosarus), Megachile 108, 169-173
Melanosmia 69
melanosoma Ckll., Melissodes 267
Melanostelis 35
melanotricha Lov. & Ckll., Osmia 99
Melea 323
Melecta 492
Meliphila 242
Melissodes 263-310
Melitoma 242-244
Meliturgopsis 331
mellifera L., Apis 545
mellifica L., Apis 545
mendacina Ckll., Coelioxys 222
mendica Cress., Megachile 117
mendica Mitch., Nomada 422
mennacus Uhler, Melissodes 295
menuachus Cress., Melissodes 295
mera Ckll., Nomada 409
mercatus Fabr., Epeolus 457
mescalerium (s) Ckll., Hoplitis 64
metallica H.S.Sm., Ceratina 506
mexicana Cress., Megachile 163
miamiensis (s) Mitch., Osmia 84
micans Lep., Xylocopa 507
micheneri Mitch., Hoplitis 64
micheneri Timb., Exomalopsis 237
michiganensis Mitch., Osmia 92
michiganensis Mitch., Stelis 45
michiganensis Mitch., Triepeolus 473
(Micranthophora), Anthophora 323
Micrapis 544
(Micronomada), Nomada 338, 354-360
micropygius Rob., Triepeolus 474
(Microstelis) Stelis 35, 42
mimula Ckll., Nomada 388
miniata Sm., Nomada 394
minima Mitch., Nomada 423
minimus (Rob.), Epeolus 452
miranda Fox, Xeromelecta 494
mississippi Mitch., Heteranthidium 29, 31
mitchelli LaBerge, Melissodes 279
mixta Costa, Megachile 120
Mizeae Ckll., Melissodes 295
modesta Cress., Nomada 356
modesta Sm., Coelioxys 211
moesta Cress., Coelioxys 213
monardae Mitch., Triepeolus 475
monardae Ckll., Hoplitis 59
monardarum Ckll., Megachile 133
(Monilosmia) Osmia 69, 78-80
montivaga Cress., Megachile 127
(Monumetha) Hoplitis 56, 58
mucida Cress., Megachile 140
mucronata Ckll., Hoplitis 61
multidens Fox, Megachile 122

N

nasuta Christ, Xylocopa (?) 507
neglecta Mitch., Megachile 152
Neolarra 490
(Neomegachile), Megachile 108
Neopasites 486
(Neotrypetes) Heriades 48
(Neoxylocopa), Xylocopa 507
nero (s) Bequaert & Plath, Bombus 527
Nevadensibombus 513
nevadensis Cress., Bombus 521
nevadensis (Cress.), Triepeolus 475
newelli Ckll., Megachile 165
nidulans Fabr., Bombus 524
nigra Lep., Melissodes 267
nigrihirtus Mitch., Triepeolus 476
nigripes Sm., Melissodes 274
nigriventris Sm., Osmia 78
nigriventris (Zett.), Osmia 77
nigrocincta Sm., Nomada 424
nitescens Ckll., Nomada 356
nitida Cress., Stelis 46
nivalis Friese, Megachile 129
nivea Rob., Melissodes 297
Nomada 338-437
(Nomada), Nomada 402-437
(Nomadula), Nomada 338, 365-371
notatum (Latr.), Anthidiellum 19
(Nothosmia) Osmia 69, 88-95
(Notoxylocopa), Xylocopa 507
novae-angliae (s) (Bequaert), Bombus 518
novomexicana Ckll., Osmia 73
nubiterrae Vier, Anthophora 328
nudata Prov., Anthophora 328
nulla (s) LaBerge, Melissodes 269
nupta Cress., Megachile 114

O

obesa Say, Paranthidium 13
obliqua (Say), Svastra 259
obliterata Cress., Nomada 395
obliteratus Graen., Triepeolus 477
oblonga Prov., Hoplitis 58
obsoleta Cress., Hoplitis 58
obtusiventris Cwfd., Coelioxys 214
ochlerata Mitch., Nomada 396
octobris Ckll., Melissodes 295
8-dentata Say, Coelioxys 215
octomaculatus (s) Rob., Nomada 351
octonotatus (s) Rob., Nomada 347
(Odontopasites), Holcopasites 486
odontophora Schlett., Heriades 51
oenotherae (Mitch.), Megachile 141
Oligotropus 108
Ontariana Sladen, Stelis 44
Ontariensis Prov., Ceratina 503
optiva Cress., Megachile 165
orba Mitch., Nomada 424
ornatus Sm., Bombus 536
Osmia 69-107
(Osmia) Osmia 72
osmioides Cress., Ashmeadiella 54
oswegoensis Mitch., Epeolus 453
ovata (Rob.), Nomada 351

P

Pachycerapis 235
(Pachynomada), Nomada 338, 379-380

Pachyosmia 69
pacifica Panz., Megachile 122
pallida Rob., Melissodes 295
pallidus Cress., Bombus 524
paludicola Ckll., Megachile 176
palustris Rob., Florilegus 253
panamensis Mich., Melissodes 273
(Paracoelioxys), Coelioxys 192
parallela Sm., Megachile 159
Paramegachile 108
Paramegalochila 108
(Paramegilla), Anthophora 323
Paranthidium 13-15
parexilis (s) Mitch., Megachile 184
parietina Sm., Osmia 98
parva Rob., Nomada 425
pasadenensis Ckll., Xeromelecta 494
(Pavostelis) Stelis 35, 39
pectoralis (Rob.), Triepeolus 478
penicillata Ckll., Megachile 186
pennsylvanicus (Degeer), Bombus 524
(Penthemisia), Centris 333
Peponapis 244-246
perbrevis Cress., Megachile 114
perexima Ckll., Megachile 176
perihirta Ckll., Megachile 159
perplexa Cress., Melissodes ..... 277 & 288
perplexa Cress., Nomada 352
perplexum (Sm.), Anthidiellum 21
perplexus Cress., Bombus 533
petalostemonis Rob., Melissodes 273
petulans Cress., Megachile 163
petulca (Cress.), Svastra 261
(Phaenosarus), Megachile 108, 156-157
philadelphi Rob., Prochelostoma 52
Philadelphica Lep., Peponapis 244
Phileremulus 490
(Phor), Nomada 338, 377-379
(Physostetha) Heriades 48
pictus (Cwfd.), Dialictus 547
piercei Cwfd., Coelioxys 217
pilleata LaBerge, Melissodes 298
pilosifrons (Cress.), Hoplitis 61
pilosula (Cress.), Epeoloides 491
pinguis Cress., Megachile 167
placida Cress., Nomada 374
plenum (Prov.), Stelis 43
plenus (s) Rob., Nomada 351
Podalirius 323
(Poecilocentris), Centris 333
policaris Say, Megachile 176
pollicaris Say, Megachile 176
porterae Ckll., Coelioxys 218
(Pratobombus), Bombus 513
pratti Cfwd., Holcopasites 488
Prochelostoma 52
producta (Cress.), Hoplitis 62
productus Rob., Heriades 51
propinqua (s) Cress., Osmia 73
(Protostelis) Stelis 35, 37
proxima Cress., Nomada 378
proxima Cress., Osmia 99
pruina Sm., Megachile 167
pruinosa (Say), Peponapis 244
pseudobrevis (s) Mitch., Megachile 116
pseudocarinatus Mitch., Holcopasites 489
(Pseudocentron), Megachile 108, 167-169
pseudops Ckll., Nomada 397
Psithyrus 538-544
psoraleae Rob., Anthidium 11
Ptilothrix 240-242
Ptilotopus 333
pugnata Say, Megachile 179
pulchella Cress., Exomalopsis 238
pulchella Sm., Nomada 395
pumila Cress., Osmia 93
punctulatus Lins., Holcopasites 488
purpuracens Sm., Osmia 72
purpurea Christ, Megachile 181
purpurea Cress., Osmia 85
purpurea Cress., Xylocopa 507
pusillus Cress., Epeolus 453
pygmaea Cress., Nomada 426
pyralitarsis Dours, Anthophora 327
(Pyrobombus), Bombus 513
Pyrrhomelecta 438

Q

4-dentata Cress., Osmia 81
quadrimaculatus (s) Rob., Nomada 351
quadrisignatus (s) Rob., Nomada 347

R

ramaleyi Ckll., Osmia 89
raui Roh, Anthophora 325
relativa Cress., Megachile 129
remigatus (Fabr.), Triepeolus 480
remipes (s) Gerst., Apis 545
ribis Ckll., Coelioxys 226
ridingsi (Cress.), Heteranthidium 28
ridingsi Rob., Bombus 531
rivertonensis Ckll., Nomada 355
(Robertsonella) Hoplitis 56, 64-67
robertsoni Ckll., Tetralonia 313
rodecki Mitch., Nomada 376
rosae (Rob.), Tetralonia 321
rotundata Fabr., Megachile 122
rubi Mitch., Megachile 152
rubicunda Oliv., Nomada 368
rufimaculatum (s) Schw., Anthidiellum 21
rufimanus Robt., Megachile 187
rufitarsis Sm., Coelioxys 220
rufithorax Graen., Triepeolus 481
Rufocinctobombus 513
rufocinctus Cress., Bombus 529
rugifrons (Sm.), Megachile 187
rugosus Mitch., Triepeolus 482
rustica Cress., Osmia 85
rustica (Say), Melissodes 300

S

salicis Rob., Nomada 428
sancta Ckll., Megachile 176
sandersoni Frank., Bombus 534
sandhouseae Mitch., Osmia 94
sapellonis Ckll., Megachile 126
Sarogaster 108
(Sayapis), Megachile 108, 173-180
sayi (s) Cress., Megachile 176
sayi Rob., Coelioxys 222
sayi Rob., Nomada 428
schizmatura Ckll., Megachile 118
(Schonherria), Xylocopa 507
scrobiculata Sm., Megachile 179
sculptifrons Cwfd., Coelioxys 210
scutellaris Cress., Bombus 526
scutellaris Say, Epeolus 454
semiagilis Ckll., Melissodes 286

semilectus Ckll., Epeolus 451
semimucida (s) Ckll., Megachile 140
seneciophila Ckll., Osmia 75
seneciophila Mitch., Nomada 370
senilis Sm., Melissodes 288
Separatobombus 513
separatus Cress., Bombus 527
sericea Cress., Osmia 99
sexdentata Rob., Megachile 159
sexmaculatus Graen., Stelis 42
sexmaculatus (s) Rob., Nomada 351
sexnotatus (s) Rob., Nomada 347
shermani Mitch., Megachile 167
simile (Cress.), Dianthidium 17
similis Cress., Exomalopsis 239
simillima Rob., Melissodes 300
simillima Sm., Osmia 79
simplex (Cress.), Hoplitis 66
simplex Prov., Megachile 126
simplex Rob., Hoplitis 61
simplex Rob., Nomada 411
simplex Rob., Triepeolus 483
simplicissima D.T., Megachile 126
skinneri Ckll., Nomada 429
sladeni Vier., Xeromelecta 494
slossoni Vier., Coelioxys 226
sobrina Mitch., Nomada 431
sodalis Cress., Coelioxys 226
speciosa (Cress.), Tetralonia 321
sphaerogaster Ckll., Nomada 432
spoliata Prov., Hoplitis 59
sponsa Sm., Anthophora 324
spruina How., Peponapis 244
stasima Lov., Osmia 79
Stelidae Turner 89
Stelidina 35
(Stelidium) Stelis 35, 40
Stelis 35-47
stevensi Ainslee, Holcopasites 486
strenua (Cress.), Xenoglossa 248
strophostylis Rob., Megachile 148
subarctica Ckll., Osmia 100
subaustralis Ckll., Osmia 75
subemarginata Cress., Stelis 47
subfasciata (Cress.), Osmia 83
subglobosa Prov., Anthophora 328
subillata LaBerge, Melissodes 301
sublunatus Mitch., Triepeolus 483
submelanophoea (s) Mitch., Megachile 140
subnigrocincta Swenk, Nomada 353
subornata (s) Ckll., Osmia 77
subrutila Lov. & Ckll., Nomada 398
suffusa (s) (Cress.), Svastra 263
superba Cress., Nomada 362
suphurata Sm., Nomada 398
Svastra 255-262
Symmorpha 492
Synalonia 312
(Synepeolus), Triepeolus 459
Synhalonia 312

T

tarsata Prov., Osmia 81
taurea (Say), Melitoma 242
temporalis Fr., Megachile ..... 126 & 179
tepaneca Cress., Melissodes 273
tephrosiana Mitch., Megachile 137
terminalis (s) Cress., Anthophora 328
ternarius Say, Bombus 536
(Terrestribombus), Bombus 513
terricola Kby, Bombus 519
tersula Ckll., Osmia 100
Tetralonia 312-323
Tetraloniella 311
texana Cress., Coelioxys 228
texana Cress., Megachile 118
texana Cress., Nomada 358
texana Cress., Osmia 87
tiftonensis Ckll., Nomada 355
tincta LaBerge, Melissodes 303
Titusella 53
titusi Ashm., Bombus 524
torrida Sm., Nomada 368
townesi Mitch., Nomada 432
townsendiana Ckll., Megachile 161
Trachina 333
(Trichopasites), Holcopasites 486
tricolor Frank., Psithyrus 541
Triepeolus 459-485
trinodis Rob., Melissodes 304
tristis Prov., Coelioxys 226
truncata (Cress.), Hoplitis 63
truncatus (Rob.), Evylaeus 547
truncatus Rob., Heriades 50
Trypetes 48
trypetina (Rob.), Stelis 44
tyrrellensis Mitch., Nomada 433

U

ulsterensis Mitch., Nomada 433
umbratus (s) Friese, Bombus 524
unicolor (s) Rob., Nomada 351
ursina Cress., Anthophora 327

V

vagans Sm., Bombus 537
valida Sm., Nomada 434
vallorum Ckll., Megachile 176
Vancouveriensis Prov., Megachile 135
variabilis (Cress.), Psithyrus 543
variabilis Rob., Melissodes 269
variolosa (Cress.), Heriades 51
vegana Ckll., Nomada 356
vernalis Mitch., Epeolus 455
vernalis Mitch., Stelis 43
vernonensis Ckll., Megachile 118
vernoniae Ckll., Epeolus 454
vernoniae Rob., Melissodes 306
vernoniana Rob., Melissodes 288
versicolor (Fab.), Centris 335
viburni Rob., Nomada 395
vicina Cress., Nomada 434
vicina Cress., Osmia 93
vidua Ckll., Megachile 133
vidua Lep., Xylocopa 507
vidua Sm., Megachile 157
Viereckella 490
vincta Say, Nomada 379
virescens (Fabr.), Agapostemon 547
virga Sandh., Osmia 101
virginiana Mitch., Megachile 120
virginiensis Ckll., Triepeolus 478
virginica Fabr., Bombus 527
virginica (L.), Xylocopa 510
viridatus (Lov.), Dialictus 547
volatilis Sm., Nomada 350
vulpecula Gerst., Osmia 98

W

walshii Cress., Anthophora 330
wardiana Ckll., Osmia 75
weemsi Mitch., Epeolus 455
wheeleri Ckll., Melissodes 308
wilmingtoni (s) (Mitch.), Megachile 184
wisconsinensis (s) Ckll., Coelioxys 196
wisconsinensis Graen., Nomada 359

X

Xanthidium 338
xanthoparius Rob.MS, Nomada 348
xanthopteralis Ckll., Melissodes 269
(Xanthosarus), Megachile 108, 157-159
Xanthosmia 69
xanthura Ckll., Nomada 400
Xenoglossa 246-249
Xenoglossodes 311
(Xeromegachile), Megachile 108, 143-154
Xeromelecta 493-497
Xylocopa 507-511
XYLOCOPIDAE 500-512
xylocopoides Sm., Megachile 171
(Xylocopoides), Xylocopa 507

Z

(Zadontomerus), Ceratina 502-507
zebratum (Cress.), Heteranthidium 29
zonatus Sm., Epeolus 456

Date Due

FEB 1 1973	JAN 3 0 1973		
JUN 4 1973	MAY 2 8 1973		
MAR 2 3 1978	MAR 1 7 1978		
APR 1 4 1978	APR 1 4 1978		
AUG 2 5 1978			
JUN 2 9 1992	JUN 2 5 1992		

Demco 293-5

UNIVERSITY OF FLORIDA
3 1262 04840 1078

4.. .3
M6r..8
V2
G3
AGRI-
CULTURAL
LIBRARY
53414